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Index to Authors, July—December, 1922

Adam, C. M..... 247
Allen, Claude A.... 13

Baker, Geo. F..... 297
Ballard, Lynn W... 163
Ballew, R. D..... 31
Bandeen, Orren I.. 171
Barker, B. S..... 260
Barron, R. F..... 219
Barstow, Mary 356
Bettman, Alfred ... 212
Bigger, Frederick... 330
Birch, John J..... 316
Blanchard, A. H... 27
Bliss, H. A..... 451
Bobb, E. V..... 419
Boehler, Chas. F... 528
Bond, C. W..... 357
Brabyn, Harry..... 138
Bronsdon, M. H.... 9
Brooke, J. F..... 259
Brouk, James A.... 302
Brower, I. C..... 229
Budd, Ralph W.... 61
Burley, Thos. F., Jr. 548
Burton, Harry B... 298

Campbell, W. C.... 451
Canavan, Ruth 199
Carpenter, Geo. A.. 341
Casey, Daniel L.... 549
Center, Charles D.. 163
Chambers, S. M.... 228
Chapman, H. D.... 527
Cheney, Charles H. 47
Cockrell, E. R..... 298
Cotton, Clarence A. 61
Crane, Jacob L., Jr. 537
Crary, Harold 353
Craster, C. V..... 431
Curley, James M... 296

Davis, Carleton E.. 135
DeWitlook, A..... 67
Dickinson, L. S.... 124
Dimmock, A. H.... 75
Dobbin, J. J..... 400
Dorsey, Susan M... 421
Dunnigan, J. S.... 331

Edwards, Harlan H. 237
Eldridge, T. B..... 143
Ellison, I. R..... 135
Emrich, August 232
Ensign, Forest C... 513
Eustace, Robert J.. 553

Fewless, T. H..... 315
Foster, W. A..... 206
Fraser, Malcolm A.. 448
Galligan, William J. 290
Gault, Lillian Cox.. 121
Goodrich, Ernest P. 311
Gould, Kenneth M.. 509
Gray, W. M..... 119
Green, Frank J. 167, 453

Hale, Frank B.... 298
Hall, Glenn 518
Halvorsen, C. A. B. 507
Hanson, Robert K.. 165
Harriss, John A.... 233
Hart, L. H..... 301
Harvey, LeRoy .. . 297
Hathaway, Alfred R. 236
Henderson Harold L. 263
Hirst, A. R.....39, 122
Holcomb, Theo. G... 355
Holmes, Florence ... 235
Howard, N. J...306, 423
Hudelson, Gordon... 335

Inglis, William E... 63

Jackson, Harry H... 422
Jacobs, Philip P.... 18
Jacocks, J. H..... 137
Jenkins, William H. 19
Jordan, Frank C.... 103

Kelsey, Francis W.. 1
Kimball, Theodora.. 500
Kinney, H. H..... 298
Kirkland, George... 332
Knight, John G..... 32
Koch, Felix J..... 24
Koiner, C. W..... 520
Kudlich, Rudolf 12
Kuntz, J. F..... 123

Layton, W. A..... 420
Lee, Ivy L..... 231
Leonard, Edwin F... 297
Lewis, Earl S..... 261
Lewis, Harold M... 467
Lewis, John V..... 202
Lovett, William P.. 159
Lowther, Burton.... 232

MacNeille, Perry R. 350
Madison, Charles I. 551
Mandel, Arch 149
Marple, Albert..... 40
Maxfield, John D... 63
McCaffree, Charles.. 453
McClintock, Merle.. 418
McDowell, F. B., Jr. 501
McGrane, W. S..... 157
McKinley, George F. 524
Meeds, C. H..... 327
Megraw, Wm. A... 209
Melton, M. E..... 550
Merrill, A. E...359, 455
Messick, Charles P.. 473
Meyers, Dudley C.. 332
Moore, A. Harry... 7
Moreau, Theodore J. 25
Moss, T. R..... 447

Nanry, W. H..... 132
Nash, Jay B....235, 419
Nelson, Arthur L... 312
Nelson, Dorothea.... 544
Neslen, C. Clarence, 297, 326
Nusbaum, R. O..... 422
Nye, George H..... 434

Obert, B. H..... 398
O'Brien, Daniel J... 524
O'Brien, Martin.... 134
Oliphant, John 54
Olson, W. M..... 557
Osborn, C. M..... 113

Page, F. D..... 422
Park, J. Ralph...63, 324
Parkin, A. J..... 516
Paul, George F..... 395
Payne, E. George... 437
Pearman, R. W., Jr. 453
Perinchief, P. J.... 67
Peters, A. O..... 36
Phinney, Sedley H.. 23
Pierce, C. C..... 217
Pierson, E. E..... 139
Powell, Chester 448
Ready, J. C..... 523
Redford, L. B..... 344
Remington, Walter H. B. 519
Ridgeway, J. A..... 136
Rightor, C. E..... 226
Roper, Lonsdale J.. 521
Rose, S. L..... 34
Ruckman, Hester... 162

Scarritt, W. C..... 328
Schaphorst, W. F... 69
Scott, J. B..... 112
Seyster, O. B..... 167
Sletten, J. N..... 354
Smith, Francis P... 107
Smyth, R. P..... 553
Spivey, S. A..... 453
Springborn, W. J... 125
Stanley, Allison F.. 329
Steffens, Henry, Jr.. 231
Stevens, Vincent S.. 259
Stevenson, T. A.... 549
Street, A. L. H...77, 173, 273, 275, 343, 377, 396, 475, 567, 571
Swan, Herbert S... 496

Tancock, Montague A, 171, 331
Taylor, Geo. R..347, 427
Tiefenthaler, Leo.... 163

Unfug, Charles O... 453
Upham, Charles M.. 319
Upson, Lent D..... 407

Van Noort, Frank J. 296
Vars, Alexander W. 505
Vaughan-Lloyd, W. E.. 35

Waugh, Joseph E... 138
Weglein, Richard.... 230
Weis, Bernard J.... 357
Weller, Eugenia H.. 261
Weller, W. Earl..55, 130
Wells, George F.... 448
West, Elizabeth H.. 216
Whitcomb, Elmer B. 355
White, Charles E... 260
Whitehead, W. J.... 36
Whiting, Eleanor... 449
Wolfe, Thomas F... 48
Woods, Carroll R... 259

Index to Cities, July—December, 1922

Addyston, Ohio
Traffic warning 24
Akron, Ohio
Smoke prevention 258
Building-line maps in zoning ordinance..... 521
Amsterdam, Holland
Municipal housing (photograph) 538
Anaheim, Calif.
Orange grove bought by Chamber of Commerce members 448
Arkansas City, Kans.
Municipal landing field..... 165
Arlington, Mass.
High school burned..... 463
Asbury Park, N. J.
Public health administration..... 398
Atlanta, Ga.
Civic organizations cooperate 260
Atlantic City, N. J.
Street lighting fixtures and standards (photographs) 257
Aurora, Ill.
Building and Loan campaign..... 449
Baltimore, Md.
Police and fire alarm cable circuits..... 117
Balancing reservoir 209
Lunch wagon for firemen..... 239
Bartow, Fla.
White Way financed..... 241
Binghamton, N. Y.
Asphalt paving inspection..... 55
Budget study 130
Motor street cleaning apparatus (photograph).. 162
Bluefield, W. Va.
Motor transportation company organized..... 259
Boise, Idaho
Fire record system 206
Boonville, N. Y.
High school burned 463
Boston, Mass.
Effect of prohibition 295
Airport assured 354
Boulder, Colo.
Inter-community visitation..... 550
Brookings, S. Dak.
Power-plant, central heating, water-supply, telephone 73
Buenos Aires, Argentine
Police "First Aid to Foreigners"..... 471
Burlington, Iowa
Work of social service and county overseer of the poor consolidated 257
Burlington, N. J.
Clean-up prizes for school children..... 67
California
Culvert problem solved 265
City planning contest 446
Canada
Government housing 4

Canton, Ill.
Rest room 448
Chanute, Kans.
Power-plant 119
Charleston, S. C.
Filter plant 501
Charleston, W. Va.
First brick-paved street in United States..... 225
Refuse destructor 575
Charlottesville, Va.
Nomination of city commissioners..... 260
Chicago, Ill.
Underground leakage 48
Motor fire apparatus (photograph)..... 59
Municipal "experts" go to Europe..... 211
Motor flushing 299
School movies..... 305
Street lighting 339
Cost of motor street sweeping..... 375
Progress on Chicago Plan..... 405
Snow activities 493
China
Fire departments 242
Cincinnati, Ohio
Repairing asphalt streets in winter..... 148
Park concerts 326
Municipal University's new dormitory..... 328
Life-saving and rescue squad..... 525
Cleveland, Ohio
Window-washing 35
Street lighting 340
Motor street paving apparatus (photograph)..... 445
Colorado Springs, Colo.
Motor highway apparatus (photograph)..... 161
Columbus, Ga.
City limits extended 453
Constantinople
Opportunity for replanning 1
Dallas, Tex.
Rat extermination 247
Public health 269
Darien, Conn.
Motor fire apparatus (photograph)..... 546
Dayton, Ohio
Child welfare campaign 36
Effect of prohibition 298
Decatur, Ill.
Impounding reservoir 139
Denver, Colo.
Dewatering outfit for excavations..... 231
Detroit, Mich.
Police headquarters 32
Police and fire alarm cable circuits..... 117
Last appearance of fire horses..... 138
Crime decrease 149
Better county government 159
Reliable municipal reports..... 230
Street lighting 339
Increased functions of city government..... 407
Municipal bus (photograph) 445
Street lighting system 507
Duluth, Minn.
School bond election 328
East Cleveland, Ohio
Lighting 113
Easthampton, Mass.
Motor fire apparatus (photograph)..... 59
Elizabeth, N. J.
Street shower 13
League of Neighbors 261
Englewood, N. J.
Housing enterprise 471
Erie, Pa.
Municipal piggery 395
Escanaba, Mich.
Tax inequalities exposed 171
Europe
City planning 537
Evanston, Ill.
Waste collection 540
Flint, Mich.
Skating-rinks 523
Fort Worth, Tex.
Effect of prohibition 298
France
City hall, type for rebuilt areas (photograph). 406
Gainesville, Fla.
Publicity Department 138
Gloversville, N. Y.
Stand-pipe 199
Grand Junction, Colo.
Swimming pool 417
Grand Rapids, Mich.
Better county government 159
School burned 461
Greeley, Colo.
Inter-community visitation..... 550
Harrisburg, Pa.
Police and fire alarm cable circuits..... 117
Working for a paid fire department..... 548
Henderson, N. C.
Publicity on school question..... 449
Highland Park, Mich.
Skating-rink 315
Homestead, Pa.
Dump transformed into playground..... 356
Illinois
Maintenance cost of brick roads..... 111
Chambers of commerce vote on city manager government 447
Sanitary districts 557
Indiana
Reducing water losses in cities..... 141
Indianapolis, Ind.
Fire prevention 104
Iowa
Counties seek bids for engineers' services..... 252
Consolidated schools 513
Iowa City, Iowa
Boulevard construction 404
Municipal outdoor theater..... 404
Jersey City, N. J.
Playground marble contests..... 7
Johnstown, Pa.
Water storage 11
Joplin, Mo.
Cost of street sweeping..... 373
Kankakee, Ill.
Concrete road opening 353
Kansas City, Kans.
Effect of prohibition 298
Kansas City, Mo.
"Park and Plan Week"..... 327
Kentucky
City planning law 158
Klamath Falls, Ore.
Playground financed by Chamber of Commerce.. 549
La Crosse, Wis.
Second winter carnival..... 448
Little Falls, N. Y.
Motor fire apparatus (photograph)..... 546
Long Beach, Calif.
Bond issues for improvements..... 163
Los Angeles, Calif.
Waste collection 22
City planning 47
Safety, and fire prevention 62
Effect of prohibition 297
Electric distributing system 333
Lowell, Mass.
Interim zoning ordinance..... 448
Madrid, Spain
Police motor-cycles (photograph)..... 547
Mariemont, Ohio
Demonstration town..... 309
Memphis, Tenn.
Motor street sweeper (photograph)..... 373
Meriden, Conn.
Police and fire alarm cable circuits..... 117
Michigan
Counties to support public health nurses..... 141
Marriage and divorce records..... 471
Milwaukee, Wis.
Street-widening program 103
Police pension system..... 263
Street lighting 338
Minneapolis, Minn.
Park motor apparatus (photograph)..... 58
Community singing 136
Street lighting 338
Winter sports 544
Mitchell, S. Dak.
Tourist camp shelter 161
Community building 419
Moberly, Mo.
Water-supply enlarged 335
Montreal, Que.
City Hall fire 41
Morgantown, W. Va.
Community score card..... 548
Muskegon, Mich.
Informing the citizens on city government..... 134
Newark, N. J.
Back-to-school campaign 164
Referendum on power-plant void..... 471
New Bedford, Mass.
Eliminating odor at garbage disposal plant..... 126
Traffic markings 434
Mayor keeps evening office hours..... 519
New Jersey
Road demonstration at state fair..... 436
The Morris Canal and the Plan of New York and Its Environs 467
Finger-print identification for civil service applicants 473

421253

New Orleans, La.
Motor fire apparatus (photograph) 58
Newport, R. I.
Financing repairs to buildings 451
New York, N. Y.
Street shower 14
Macadam foundations 57
Motor fire apparatus (photograph) 59
"Don't Get Hurt" campaign 121
Awards to firemen 127
Traffic violation cards 233
Mosaic map of city 253
Infant mortality rate 269
Fire prevention inspectors organized 471
Water-front fire protection 481
New York State
Cities cooperate on fuel problems 389
Cost of police work 512
Street lighting costs 518
Niagara Falls, N. Y.
Police and fire alarm cable circuits 118
Norfolk, Va.
City manager plan 19
North Carolina
Top-soil road construction 116
Carnivals prohibited by county board of health. 250
Oakland, Calif.
Wild Duck Pageant 235
Forest recreation camp 418
Oil and gasoline station at municipal garage 522
Oak Park, Ill.
Accident prevention 332
Instructing children in municipal affairs 520
Ohio
Memorial highway 225
Omaha, Nebr.
Volunteer traffic officers 169
Municipal coal yard 330
Long service of cast iron pipe 508
Ontario, Can.
Progressive development of roads 208
Dragging roads 240
Pasadena, Calif.
Big forward steps 519
Paterson, N. J.
Effect of prohibition 296
Parking of cars on business streets 496
Pawhuska, Okla.
Warehouse and stock record system 303
Pawtucket, R. I.
Traffic signs 341
Pennsylvania
Street lighting statistics 128
Fighting traveling carnivals 317
Philadelphia, Pa.
Swimming and wading pools 33
Gasoline service station 123
Yellow fire hydrants 135
Motion pictures further improvement program ... 229
Snow removal 487
Garbage incinerator 557
Philippine Islands
Road building 240
Phoenix, Ariz.
City flag 332
Pierre, S. Dak.
Swimming pool 259
Tourist camp 355
Pittsburgh, Pa.
Smoke survey 12
Political candidates' positions on progressive measures 63
Graded tax law 324
Widening hillside streets 329
Plainfield, N. J.
Control of pavement openings 505
Plainview, Tex.
Board of City Development 551
Pomona, Calif.
Motor apparatus for street work (photograph) .. 547
Pontiac, Mich.
Complaint slips carried by City Commissioners .. 229
Portland, Ore.
Lake made by unemployed 234
Effect of prohibition 297
Port Richmond, Calif.
Port development 527
Portsmouth, Va.
Recreation park 520
Poughkeepsie, N. Y.
Bus terminal, comfort station, and parking grounds 60
Providence, R. I.
Street paving methods 9
Planting Day 61
Quincy, Ill.
Financing secondary roads 163
Raleigh, N. C.
City planning 143
Rio de Janeiro, Brazil
Completion of boulevard 541
Rochester, N. Y.
Police and fire alarm cable circuits 118
Rock Island, Ill.
Wading pool 25
Rouen, France
Water-front facilities (photograph) 539
St. Louis, Mo.
Smoke survey 12
Police record department 133
Police patrol trucks (photograph) 256
Accident prevention among school children 437
Public recreation in Americanization work (photograph) 517
St. Paul, Minn.
Motorized fire apparatus 146
St. Peter, Minn.
Election of Mayor 121
St. Petersburg, Fla.
Planting Day 230
Salina, Kans.
"Success Talks" for municipal employees 2, 419
Salt Lake City, Utah
Smoke survey 12
Effect of prohibition 297
Municipal golf course 325
Sanford, Fla.
Bond issues for city improvements 453
San Francisco, Calif.
Survey of school system 65
Fire Chief's home 331
Roping back crowds during parades 524
San Jose, Calif.
Chamber of Commerce uses radio 152
Schenectady, N. Y.
Sewage disposal works 202
Scottsbluff, Nebr.
New high school 162
Scranton, Pa.
Technical High School (photograph) 26
Seattle, Wash.
Expenditures of city 75
Pageant of "The Wayfarer" 353
Sioux Falls, S. Dak.
Chamber cultivates civic organizations 453
South Bend, Ind.
Traffic rules taught 167
Safety progress 451
South Nyack, N. Y.
Financing street paving 400
Springfield, Mass.
Water-works administration 236
Effect of prohibition 297
Hampden County memorial bridge 518
Stamford, Conn.
Lighting standard (photograph) 38
Stoughton, Wis.
Motor fire apparatus (photograph) 256
Sturgis, Mich.
Parking plan 31
Summit, N. J.
Civic center campaign 350
Tarboro, N. C.
Milk pasteurization plant 137
Taunton, Mass.
Lighting plant 312
Texarkana, Ark.-Tex.
Ant eradication campaign 550
Trinidad, B. W. I.
Mosquito control 51
Trinidad, Colo.
Reduction in building costs 63
Walsenburg, Colo.
Paving 453
Warsaw, Ind.
Park and playground 422
Washington, D. C.
Motor fire apparatus (photograph) 160
Waterbury, Conn.
Police and fire alarm cable circuits 118
Removing objectionable roadside advertising 553
Wayne County, Mich.
Progress of bridge construction shown on bulletin board 345
Whiting, Ind.
Memorial community house 516
Wilmette, Ill.
School burned 461
Wilmington, Del.
Effect of prohibition 297
Wilmington, N. C.
Motor fire apparatus (photograph) 160
Winston-Salem, N. C.
Recreation activities 34

Index to Subjects, July—December, 1922

Beginning with this volume, articles are indexed by title under main classification and in the order of publication. The same principle of sequence of publication is followed in the city index. Cross-indexing is reduced as much as possible.

As an aid to readers in looking up references, the page numbers of the individual issues of the volume are given:

July, 1-101	October, 295-393
August, 103-197	November, 395-489
September, 199-293	December, 491-581

Accident Prevention
Thirty-Six Feet of Injuries (Los Angeles, Calif.) 62
Mound Traffic Markers 95
New York Plans a Gigantic "Don't Get Hurt" Campaign 121
You Can Say "Danger" Too Often 122
Illuminating the Traffic Cop 193
"Don't Kill a Child" (Oak Park, Ill.) 332
Sanding Slippery Streets and Sidewalks 387
How the St. Louis Schools Have Reduced Accidents 437
South Bend's Safety Progress 451
Instructing Children in Municipal Affairs (Oak Park, Ill.) 520
See also "Fire," "Legal Decisions," "Publications," "Traffic"

Accounting, Municipal—See "Finance"

Americanization
What a League of Neighbors Means (Elizabeth, N. J.) 261

Auditoriums—See "Community Buildings"

Aviation
Arkansas City's (Kans.) Landing Field Now Municipal 165
Chamber's Action Assures Airport for Boston 354
The Need for a Federal Air Law 542

Baths and Swimming Pools
A Temporary Substitute for a Swimming Pool (Elizabeth, N. J.) 13
A Memorial Wading Pool in Rock Island, Ill. 25
Philadelphia's Recreation Centers 33
A Vacuum Cleaning System for Swimming Pools 89
Pierre's (S. Dak.) Municipal Swimming Pool 259
See also "Publications"

Bill-Boards and Signs
Removing Objectionable Roadside Advertising (Waterbury, Conn.) 553

Bond Issues—See "Finance"

Book Reviews—See "Publications"

Bridges and Culverts
Man-made Malaria (road drainage) 6
Keeping Steel Highway Bridges in Condition 93
Painting Structural Steel Bridges Saves Money. 242
Solving the Culvert Problem in the Land of Seasonal Rains (California) 265
Progress of County Bridge Construction Shown on Bulletin Board (Wayne County, Mich.) 345
The Hampden County Memorial Bridge, Springfield, Mass. 578

Buildings, Public
Window-Washing a Science Up-to-Date (Cleveland, Ohio) 35
Chamber Secures Reduction in Building Costs Trinidad, Colo.) 63
Greek Architecture and Gasoline Service Stations 123
Metal Columns for Municipal Buildings 187
City Hall, French Type in Rebuilt Areas (photograph) 406
See also "Community Buildings," "Contracts," "Lighting," "Schools"

Chamber of Commerce Activities in Public Affairs—See "Civic and Commercial Organizations and Their Work"

Charities
Work of Social Service and County Overseer of the Poor Consolidated (Burlington, Iowa) 357

Child Welfare
Dayton's Child Welfare Campaign 36
See also "Publications"

City Manager Plan
What the City Manager Plan Has Meant to Norfolk, Va. 19
Bringing the Government Close to the People (Muskegon, Mich.) 134
City Commissioners Carry Complaint Slips (Pontiac, Mich.) 229
Lakeland (Fla.) Votes for Manager Plan 356
City Purchases "Success Talks" for Employees (Salina, Kans.) 419
A State Chamber of Commerce Referendum on City Manager Government (Ill.) 447

City Planning, Replanning and Zoning
Constantinople's Burnt Areas Provide Unique Opportunity for Large-Scale Replanning 1
A Great City-Planning Project on the Pacific Coast (Los Angeles, Calif.) 47
What City Planning Means to Raleigh (N. C.) 143
Forecasting the Future of a City (for telephone system) 152
Kentucky Adopts City Planning Law 158
The Constitutionality of Zoning 212
Making the Railroad Gateways of the City Attractive 221
Mosaic Maps of Cities (New York, N. Y.) 253
Mariemont (Ohio), America's Demonstration Town 309
Hillside Streets Require Special Treatment in City Planning (Pittsburgh, Pa.) 329
The Campaign for a Civic Center in Summit, N. J. 350
Developing the Beauty of a Small City (Iowa City, Iowa) 404
Remarkable Progress Made on Chicago Plan 405
California Chambers in City Planning Contest 446
Chamber of Commerce Secures Interim Zoning Ordinance (Lowell, Mass.) 448
The Morris Canal and New Jersey's Opportunity. 467
Centenary of Frederick Law Olmsted, Senior. 500
Building Line Maps a Part of Akron's (Ohio) Zoning Ordinance 521
Europe Offers City Planning Ideas for America. 537
See also "Legal Decisions," "Publications," "Traffic"

City's Legal Rights and Duties, The—See "Legal Decisions"

Civic and Commercial Organizations and Their Work 60, 162, 258, 353, 446, 548

Akron, Ohio 258
Anaheim, Calif. 448
Arkansas City, Kans. 165
Atlanta, Ga. 260
Auburn, Maine 261
Aurora, Ill. 449
Bluefield, W. Va. 259
Boston, Mass. 354
Boulder, Colo. 550
Burlington, Iowa 357
Burlington, N. J. 67
California 446
Canton, Ill. 448
Charlottesville, Va. 260
Chicago, Ill. 447
Columbus, Ga. 453
Escanaba, Mich. 171
Greeley, Colo. 550
Harrisburg, Pa. 548
Henderson, N. C. 449
Homestead, Pa. 356
Illinois 447
Kankakee, Ill. 353
Klamath Falls, Ore. 549
La Crosse, Wis. 448
Lakeland, Fla. 356
Long Beach, Calif. 163
Los Angeles, Calif. 62
Lowell, Mass. 448
Milwaukee, Wis. 163
Mitchell, S. Dak. 162
Morgantown, W. Va. 548
Newark, N. J. 164
New Orleans, La. 260
Newport, R. I. 451
Omaha, Nebr. 169
Pierre, S. Dak. 258, 355
Pittsburgh, Pa. 63
Plainview, Tex. 551
Portland, Ore. 235
Poughkeepsie, N. Y. 60
Providence, R. I. 61
Quincy, Ill. 163
Sanford, Fla. 453
San Francisco, Calif. 65
San José, Calif. 152
Seattle, Wash. 353
Sioux Falls, S. Dak. 453
South Bend, Ind. 167, 451
Texarkana, Ark.-Tex. 550
Trinidad, Colo. 63
Walsenburg, Colo. 453
Waterbury, Conn. 553

Focusing the City's Activities in the Chamber of Commerce (Atlanta, Ga.) 260
A Well-planned Investment (Anaheim, Calif.) 448
City Limits Extended (Columbus, Ga.) 453
Chamber Cultivates Civic Organizations (Sioux Falls, S. Dak.) 453
A Community Score Card (Morgantown, W. Va.) 548
Texarkana (Ark.-Tex.) Chamber No Sluggard in Going After the Ant 550
An Inter-Community Visitation (Greeley-Boulder, Colo.) 550
A Municipally Supported Board of City Development (Plainview, Tex.) 551
For other activities of civic and commercial organizations see "Accident Prevention," "Aviation," "Bill-Boards," "Buildings," "Charities," "City Manager Plan," "City Planning," "Cleaning," "Elections," "Finance," "Fire," "Health," "Highways," "Housing," "Pageantry," "Planting," "Publications," "Radio," "Recreation," "Rest Rooms," "Schools," "Smoke," "Traffic"

Civil Service
Compare Civil Service with the Spoils System, Not with Ideal Private Employment..... 132
The Finger-Print Method of Identification in New Jersey 473
Cleaning, City
Clean-up Prizes for School Children (Burlington, N. J.) 67
Indianapolis, Ind. 105
The Anti-Litter Movement in America..... 157
New Orleans, La. 260
Comfort Stations—See "Health and Sanitation"
Community Buildings and Centers
A Community Building in a South Dakota City (Mitchell) 419
Whiting's (Ind.) Memorial Community House. 516
See also "Publications"
Community Organization—See "Publications"
Conferences, Conventions and Exhibitions 79, 177, 277, 346, 469, 555
Contracts, Public
General Contract Best for Municipal Building Construction 267
See also "Legal Decisions"
County Government
Detroit and Grand Rapids Work for Better County Government 159
See also "Publications"
Courts—See "Publications"
Dust Prevention—See "Street Cleaning"
Elections
Finding Out Where Candidates Stand (Pittsburgh, Pa.) 63
From the Mayor of St. Peter, Minn..... 121
How Charlottesville (Va.) Nominated Its City Commissioners 260
P. R. in a Nutshell 371
Referenda Sometimes Fail to Register (Newark, N. J.) 471
Some November Election Results..... 555
See also "Finance," "Legal Decisions"
Engineering for Municipalities and Counties
Chicago's Eighteen Municipal "Experts" Go to Europe 211
Some Counties Still Seeking Bids for Engineers' Services (Iowa) 252
See also "Highways," "Lighting," "Water-Supply," etc.
Finance, Municipal
Seattle Takes Exception to Census Bureau Data. 75
Binghamton's Budget Study Wins Public Interest 130
Six Bond Issues Carried by Chamber (Long Beach, Calif.) 163
Tax Inequalities Exposed by Chamber (Escanaba, Mich.) 171
Comparative Bonded Debt of Thirty-Two Cities as of January 1, 1922..... 226
Getting the Facts to the Public (Detroit, Mich.) 230
A Warehouse and Stock Record System for Cities (Pawhuska, Okla.)..... 303
How Pittsburgh's Graded Tax Law Is Working. 324
Special Assessments for Local Improvements... 396
Research and the Increased Functions of City Government (Detroit, Mich.) 407
Bond Issues for City Improvements (Sanford, Fla.) 453
The World's Largest Municipal Budget (New York, N. Y) 491
See also "Legal Decisions," "Publications," "Schools"
Fire Prevention and Control
Constantinople, Turkey 1
The Fire Hazard of Radio 5
Lessons from the Montreal City Hall Fire..... 41
Chamber of Commerce work for fire prevention (Los Angeles, Calif.)..... 62
An English Motor Turntable Fire Ladder..... 101
Fire Prevention and Fire Protection Campaigns. 103
Fire alarm cable circuits in representative American cities 117
1921 National Fire Loss $485,000,000..... 122
Two Kinds of Firemen (New York, N. Y.)..... 127
Yellow Fire Hydrants for Philadelphia..... 135
Last Appearance of Detroit's Fire Horses..... 138
Fire Regulations Undergoing Changes in Many Cities 142
Reducing the Cost of Fire Protection..... 146
Schoolhouse Fire Hazards..... 156
The Fire Record System of Boise, Idaho..... 206
Fuel for Fire Fighters (Baltimore, Md.; lunch wagon) 232
The Operation of Chinese Fire Departments... 242
A Sad Record of Destruction of American Homes and Industries 246
Hose Threads of 250 Cities Standardized in Two Years 249
A Fire Ordinance for Small Cities and Towns.. 285
Electric Sirens for Volunteer Fire Departments. 293
San Francisco Provides Home for Fire Chief.. 331
The Volunteer Fire Department and Its Problems 344
A New Pump for Small Town Fire Departments. 383
Fire Prevention Week, South Bend, Ind..... 451
Non-Combustible Construction Protects School Buildings 461
Fire Prevention Inspectors in New York Have Organized 471
Protecting New York's Water-Front from Fire. 481
Cincinnati's Life-Saving and Rescue Squad..... 525
Working for a Paid Fire Department (Harrisburg, Pa.) 548
See also "Forestry," "Legal Decisions," "Motor Apparatus," "Publications," "Radio"
Flags, City
Phœnix (Ariz.) Adopts an Official Flag..... 332
Fly Extermination—See "Health"
Forestry
Tree Planting on Highways..... 39
Roadside Planting 225
Insuring Satisfaction in Tree Planting..... 243
Consider the Property Owner in Roadside Planting 252
Problems in the Reforestation of Watersheds.347, 427
Save the Useful and Ornamental Roadside Trees 426
Legislation to Preserve the Beauty of Roads.... 528
See also "Publications"
Forward Steps in Municipal Affairs, 31, 133, 229, 325, 417, 519
Fuel Problem
Omaha's Municipal Coal Yard..... 330
New York State Cities Cooperate on Fuel Problem 389
Garbage Collection and Disposal—See "Waste Collection"
Gifts for Cities
A Municipal Golf Course the Gift of a Bishop (Salt Lake City, Utah)..... 325
A Citizen's Gift to the Children of His City (Grand Junction, Colo.; swimming pool)..... 417
Health and Sanitation
Man-made Malaria 6
Promoting the Community Health..... 18
Why Quarantine Should Be Enforced in Cases of Measles (diagram) 30
The School Lunch in Rural and Urban Districts 43
Mosquito Control Through Lined Drains (Trinidad, B. W. I.) 51
Comfort Station, Poughkeepsie, N. Y..... 60
The Attention Given to the Health of School Children 127
Municipal Milk Pasteurization Plant Proves Profitable (Tarboro, N. C.) 137
Michigan Counties to Support Public Health Nurses 141
Prostitution: A Community Problem..... 217
Hospital zone (photograph) 233
The Economic Loss Due to Rats..... 247
Resolution of Board of Health Upheld (N. C.; traveling carnivals prohibited)..... 250
Thirty-Five Organizations Cooperate in New Orleans (insect extermination, etc.)..... 260
The Financial Value of Health to a City..... 269
An Index to Health (U. S. Bureau of Education standards) 271
Ready to Pick Cities for Health Demonstration. 281
The Menace of Traveling Carnivals..... 316
Public Health Administration in Asbury Park, N. J. 398
The Social Menace of the Rat..... 431
How Much Should a City Health Officer Be Paid? 509
It's Up to You (tuberculosis eradication)..... 536
See also "Publications," "Schools"
Heating, Central
Brookings, S. Dak. 73
Highways (Roads, Pavements, Streets)
Street Paving Methods in Providence, R. I.... 9
Where the Road Money CameFrom(U.S.in1921) 10
Developments in Methods of Constructing Brick Pavements 27
Average Costs of Road Construction (U. S.)... 38
House Numbers on the Curb..... 40
Asphalt Paving Inspection (Binghamton, N. Y.) 55
Reduce the Losses from Impact (New York, N. Y.) 57
The Parable of the Three Roads..... 107
Maintenance Cost of Brick Roads (Ill.)..... 111
Top-Soil Road Construction in North Carolina. 116
Repairing Asphalt Streets in Winter..... 148
Milwaukee Embarks on Street-Widening Program..... 163
Financing Secondary Roads (Quincy, Ill.)..... 163
The Progressive Development of Roads..... 208

Memorial highway, Utica to Hamilton Crossing, Ohio 225
What Shall We Do with Our Old Rough Pavements? 237
Dragging the Roads—Method Used in Ontario.. 240
Roads Important in the Development of the Philippines 240
The First Brick-paved Street in the United States (Charleston, W. Va.) 255
Flexible Type Roads..... 267
Limitation upon the Power of a City to License Use of Its Streets..... 275
Comparison of Subdrainage of Highways by Deep Side Ditches and by Tile Drains..... 319
Celebrates Concrete Road Opening (Kankakee, Ill.) 353
Progress vs. Patchwork—Economy in Small-Town Street Construction (S. Nyack, N. Y.) 400
Iowa City, Iowa (photograph) 404
Road Demonstration at State Fair (New Jersey) 436
More Paving for Walsenburg(Colo.)..... 453
The Cold Patch Method of Maintaining Roads.. 463
Pennsylvania's Road Mileage..... 465
Municipal asphalt plants (U. S.)..... 495
The Control of Pavement Openings (Plainfield, N. J.) 505
Cost of Federal Highways..... 506
Road Building a Part of Brazilian Centenario.. 541
See also "Publications"

Housing
Results of Government Housing in Canada.... 4
Los Angeles, Calif., Palos Verdes project..... 47
Building costs reduced, Trinidad, Colo..... 63
Municipal Building Codes..... 201
Chamber Puts Over Successful B. & L. Campaign (Aurora, Ill.)..... 449
Financing Repairs to Buildings (Newport, R. I.) 451
Englewood (N. J.) Has a Unique Housing Enterprise 471
See also "Publications"

It will interest you to know that—..... 471

Law, Municipal—See "Legal Decisions"

Legal Decisions 77, 173, 273, 275, 343, 377, 396, 475, 567, 571

Liability, Municipal—See "Legal Decisions"

Libraries, Public
Municipal Reference Service for the Small City. 216

Licenses and Permits—See "Legal Decisions"

Lighting, City and Street
Essentials of Modern Street Lighting..... 37
East Cleveland (Ohio) Street Lighting Combines Good Appearance and Effective Illumination 113
Summary of Street Lighting Statistics of Pennsylvania Cities of the Third Class—1921..... 128
Improving the Distribution of Light from Street Lamps 183
Novel Plan Finances New White Way (Bartow, Fla.) 241
Street Lighting Standards and Fixtures Displayed at Atlantic City, N. J. (photographs). 257
Addition to Taunton (Mass.) Municipal Lighting Plant 312
Minneapolis Investigates Street Lighting Conditions 338
Illuminating the Facade of a County Court House (Newark, N. J.)..... 369
The Development of Street Lighting in 1922... 411
See also "Legal Decisions," "Publications."

Manufacturers' and Contractors' Items....85, 183, 283, 383, 479
Mayor Keeps Evening Office Hours (New Bedford Mass.) 519

Methods, Materials and Appliances—See "Manufacturers' and Contractors' Items"

Milk, Inspection and Regulation of—See "Health"

Mosquito Extermination—See "Health"

Memorials
Highway Makes Unique Memorial (Ohio)..... 225
Memorial Community House, Whiting, Ind..... 516
Hampden County memorial bridge, Springfield, Mass. 518

Motion Pictures
Movies to Help Put Over Improvement Program (Philadelphia, Pa.) 229
School Movies to Lessen Truancy (Chicago, Ill.) 305

Motor Apparatus
Busses 259, 445
Fire.....58, 59, 101, 146, 160, 175, 256, 546
Highways 161, 445, 547
Oil and Gas Station at Municipal Garage (Oakland, Calif.) 522
Parks 58, 59
Police 59, 256, 547
Street Cleaning 161, 299, 373

Municipal Ownership
Power-plant, heating system, water-supply, telephone, Brookings, S. Dak..... 73
Municipal Asphalt Plants (U. S.)..... 495
See also "Publications"

Ordinances—See "City Planning," "Legal Decisions," "Publications," "Traffic"

Pageantry
Wild duck pageant, Portland, Ore..... 235
Seattle's Great Pageant..... 353
Parades in Streets, Prohibiting..... 567

Parks
Lawn-Mowing Cost Affected by Species of Ornamental Trees 124
Portland's (Ore.) Unemployed Made This Lake. 234
Does the Public Attend the Great Free Park Concert? (Cincinnati, Ohio)..... 326
"Park and Plan Week" Arouses Much Interest (Kansas City, Mo.) 327
How Much Park Space Has Your City? (diagram) 416
Warsaw (Ind.), Spruces Up..... 422
Utilizing the Morris Canal, New Jersey, in planning a comprehensive park system..... 467
See also "Publications"

Pavements—See "Highways"

Pensions in Public Employment—See "Police"

Planting for City Beautification
Fifth Annual Planting Day Celebrated (Providence, R. I.) 61
City Planting Day in St. Petersburg (Fla.)..... 230

Playgrounds—See "Recreation"

Police
Detroit Has Fine New Police Headquarters.... 32
Milwaukee County police abolish speed traps... 112
Police and Fire Alarm Cable Circuits in Representative Cities 117
A Model Record Department (St. Louis, Mo.). 113
Why Crime Decreased in Detroit..... 149
Milwaukee Adopts Scientific Pension System for Police Department 263
What Some Mayors Think of Prohibition..... 295
Cost of Police Work in Cities of New York State 512
Roping Back Crowds During Parades (San Francisco, Calif.) 524
See also "Legal Decisions, Motor Apparatus," "Traffic"

Population, Distribution of, 1920 Census (U. S.). 524

Power-Plants, Municipal and Their Equipment
Improving the Municipal Light and Power-Plant of Brookings, S. Dak..... 69
Testing Increases City Power-Plant Efficiency (Chanute, Kans.) 119
The World's Largest Municipal Distributor of Electricity (Los Angeles, Calif.)..... 333
Seattle Orders New Equipment for Gorge Power-Plant 385
See also "Publications"

Publications
Book and pamphlet notices....81, 179, 279, 381, 477
Manufacturers' literature on methods, materials and appliances.....Adv. pp. 4 and 6 in each issue
Municipal reports 181, 281

Publicity, City
Gainesville Establishes a Publicity Department. 138
Did You Ever Stop to Think— 403

Public Works
Motion pictures help public works program, Philadelphia, Pa. 230
Pumping Equipment for Dewatering Excavations (Denver, Colo.) 231
Big Forward Steps in Pasadena (Calif.)..... 519
See also "Publications," "Water-Supply," etc.

Radio
San José a Close Second in Use of Radio..... 152
Radio Fire Hazard Overemphasized..... 305

Recreation, Public
Playground Marble Contests Help Build Character (Jersey City, N. J.)..... 7
Well-rounded Recreation Activities (Winston-Salem, N. C.) 34
Community Singing in Minneapolis..... 136
The Friendly Town of Mitchell (S. Dak.; tourist camp shelter) 162
Why the Ducks Come to Oakland (Calif.)..... 235
League of Neighbors, Elizabeth, N. J..... 261
The Care of Municipal Skating-Rinks (Highland Park, Mich.) 315
Salt Lake City's municipal golf course..... 325
Dangerous "Amusement Devices"..... 334
Kankakee, Ill., celebrates concrete road opening. 353
A New Tourist Camp at Pierre (S. Dak.)..... 335
Homestead (Pa.) Makes Good Use of a Dump.. 356
The Municipal Outdoor Theater in Iowa City, Iowa (photograph) 404
Oakland's (Calif.) Municipal Recreation Camp. 418

Warsaw, Ind., dumping ground transformed into playground 422
Second Winter Carnival a Great Success (La Crosse, Wis.) 448
A Picturesque Recreation Park for a Virginia City (Portsmouth) 520
The Skating-Rinks in Flint, Mich. 523
Outdoor winter sports in Minneapolis 544
Klamath Falls (Ore.), Playground Financed by Chamber of Commerce 549
How to Create Interest in Public Playgrounds .. 573
See also "Baths and Swimming Pools," "Parks," "Publications"

Rest Rooms, Public
A Busy Rest Room (Canton, Ill.) 448

Roads—See "Highways"

Salaries of Public Employees
What Is a Fair Salary for a City Engineer? 15
How Much Should a City Health Officer Be Paid? 509
See also "Publications"

Schools, Public
Scranton, Pa., Technical High School (photograph) 26
Overhauling the School System (Los Angeles, Calif.) 65
New High School for Scottsbluff (Nebr.) 162
Newark's (N. J.) Back-to-School Campaign 164
Duluth Votes Half-Million for Schools 328
Cincinnati's Municipal University to Have Big Dormitory 328
The Right to See Straight 340
Designing and Equipping the School Cafeteria, 359, 455
American Education Week, December 3-9 410
$17,400,000 for Los Angeles Schools 420
Publicity on the School Question (Henderson, N. C.) 449
Consolidated Schools in Iowa 513
See also "Accident Prevention," "Fire," "Motion Pictures," "Publications"

Sewers and Sewage Disposal
A Rapid Catch-Basin Cleaner 197
The Construction and Operation of the Sewage Disposal Works at Schenectady, N. Y. 202
Asbury Park, N. J. 399
The Value of Sanitary Districts (Illinois) 557
The Necessity for Water-proof Joints in Sewer Pipe 579
See also "Publications"

Smoke Nuisance
The Soot Burden on American Cities 12
Akron Chamber Clears the Air 258
See also "Publications"

Street Cleaning
Speeding Up Snow Removal 193
One-Man Graders Freed Snow-bound City 293
Motor Flushing in Chicago 299
The Developing of Street Sweeping 573
Snow Removal by Counties 391
How Philadelphia Handled Last Winter's Snow. 487
Chicago's Snow Activities 493
See also "Legal Decisions," "Motor Apparatus"

Street Lighting—See "Lighting"

Streets—See "Highways"

Swimming Pools—See "Baths"

Taxation—See "Finance"

Telephone, Municipal
Brookings, S. Dak. 73

Traffic and Transportation
A Telling Highway Warning (Addyston, Ohio). 24
Solving the Parking Problem in a Small City (Sturgis, Mich.) 31
City Transportation and the City Engineer 54
Poughkeepsie's Bus Terminal, Comfort Station, and Parking Grounds 60
Milwaukee County Police Abolish Speed Traps .. 112
"Danger" signs 122
Educating the Public on Traffic Rules (South Bend, Ind.) 167
Omaha Volunteer Traffic Officers Prove Valuable 169
New Yorkers Must Carry Traffic Violation Cards 233
A Motor Transportation Company Organized (Bluefield, W. Va.) 259
An Electric "Talking Lamp" for Highway Traffic Control 289
The Design of the Street System in Relation to Vehicular Traffic 311
Informing the Autoist Regarding Local Traffic Ordinances (Pawtucket, R. I.) 341
Is the Road Surface the Proper Place for Direction Signs? (New Bedford, Mass.) 434
Limitations of Municipal Power to Control Vehicular Traffic 343
Flashing Traffic Signal and Information Booth Attract Attention (Detroit, Mich.) 421
Our City Thoroughfares—Shall They Be Highways or Garages? (Paterson, N. J.) 496
See also "Publications"

Tree Planting—See "Forestry"

Utilities, Public
Shall the States Lose Control of the Public Utilities? 23
See also "Municipal Ownership," "Water-Supply," "Power-Plants"

Waste Collection and Disposal
Garbage and Refuse Collection Motorized in Los Angeles 22
Combating Odor Nuisance at Garbage Disposal Plants 125
Garbage, Rubbish and Ash Collection and Disposal 228
Erie (Pa.) Has Model Municipal Piggery 395
Asbury Park, N. J. 339
Solving the Ash and Rubbish Collection Problem (Evanston, Ill.) 540
Charleston, W. Va., to Have Refuse Destructor. 575
New Garbage Incinerator for Philadelphia 577
See also "Publications"

Water-Front Development
Port Development in Progress at Richmond, Calif. 527

Water-Supply and Water-Works
Water Storage in Johnstown, Pa. 11
Underground Leakage—Its Relation to Mains and Services (Chicago, Ill.) 48
Preparing Wells for Pneumatic Pumping 53
Brookings, S. Dak. 73
Hydraulic Rams for Municipal Water-Supplies .. 93
An Emergency Truck for Shutting Off Water-Works Valves 99
The part played by the water department in fire prevention 104
Decatur's New Impounding Reservoir 139
Reducing Water Losses in Indiana Cities 141
Promoting Water-Works in Small Towns and Villages 153
The Stand-Pipe That Solved Gloversville's (N. Y.) Water Storage Problem 199
A Balancing Reservoir (Baltimore, Md.) 209
The Administration of Municipal Water-Works. 236
Centrifugally Cast Iron Pipe. 251
The Removal of Taste and Odors by Aeration, Filtration and Other Processes 306, 423
Moberly, Mo., Enlarges Water-Supply 335
A Graphic Water-Stage Register for Reservoirs. 383
Asbury Park, N. J. 399
Hydrant Rentals and the Financing of Water-Main Extensions 439, 529
Modernizing the Filter Plant of the Charleston (S. C.) Water Department 501
Cast Iron Pipe Relaid After 36 Years of Service (Omaha, Nebr.) 508
See also "Forestry," "Legal Decisions," "Publications"

Weights and Measures
Detecting Shortages, Securing Evidence, and Prosecuting Offenders in Short Weight Cases. 219

Zoning—See "City Planning"

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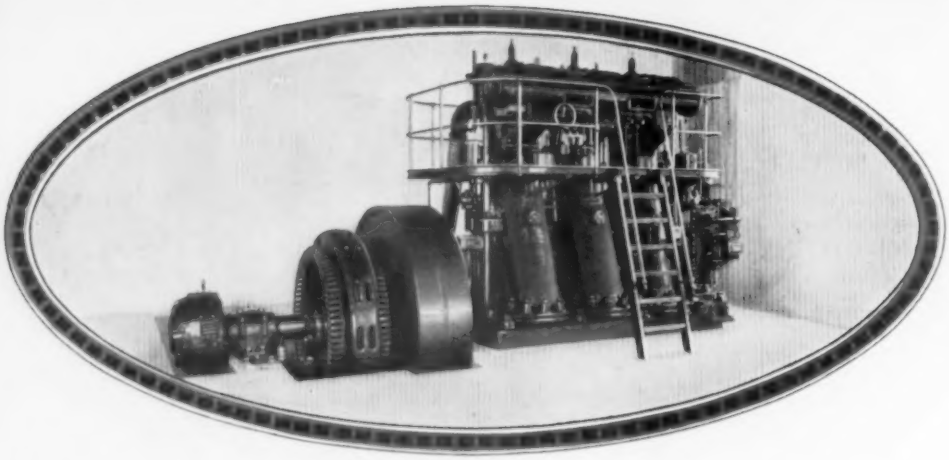

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Constantinople's Burnt Areas Provide Unique Opportunity for Large-Scale Replanning

By Dr. Francis W. Kelsey

Ex-President, American Institute of Archaeology

AMERICANS find it easy to believe that the United States and Canada afford opportunities for city planning without a parallel elsewhere, on account of the recent origin and rapid development of the centers of population, and the temporary character of so large a part of the construction. Nevertheless, no American city of large size and strategic location at the present time more earnestly invites the attention of those interested in this field than Constantinople, Turkey.

In the European quarter of Constantinople there are buildings not unlike those of the cities of northern Europe. But in Stamboul, the heart of the Turkish city, and other native quarters, wood is extensively employed and the construction is of the flimsiest. In the hot summers the wood becomes as dry as tinder, and strong winds from the north easily fan the most insignificant blaze into a conflagration. Until recently the facilities for fighting fire were totally inadequate, and the firemen were more interested in extorting money from those whose property was endangered than in putting out the fires.

Hence it has come about that in recent years approximately one-fourth of the area of Stamboul has been burned over. The burnt areas—not to make account of small fires—aggregate 2,089,000 square meters out of a total area of 8,500,000 square meters. Other fires have cleared extensive regions in the northern part of the city, and also in Scutari, which is on the east side of the Bosphorus and not shown on the Plan.

The relation of the burnt areas to the rest of the city may be seen at a glance. The accompanying Plan with the areas marked was prepared for the United States High Commissioner, Rear Admiral Mark L. Bristol, and is published with his permission. It is evident that the destruction has been caused by a series of seven great conflagrations.

The Burned Areas

The first of these fires desolated the area in Stamboul marked "A" on the Plan. It started on August 26, 1908, and destroyed 1,500 buildings. The second great fire commenced July 24, 1911, in the smaller of the two areas marked "B" and leaped across to the larger area; it burned 2,463 buildings. The following day the area marked "C," in the Jewish quarter, was burnt over. The area marked "D" was burned June 3, 1912.

The largest burnt area in Pera is that marked "E" on the Plan. The fire started on July 26, 1915, a short distance south of the German Embassy, which occupies a dominating position on the Pera ridge, and spread southward, roughly paralleling the shore of the Bosphorus. It consumed 1,400

buildings. The most recent fire on the east side of the Golden Horn broke out on June 21, 1919; the burnt area is marked "G."

The most fearful conflagration of all commenced on June 13, 1918, and swept over the area marked "F." It cleared a broad strip from near the edge of the Golden Horn southward over the peninsula through the heart of Stamboul. It destroyed 8,000 buildings and left desolate 1,100,000 square meters, slightly more than one-eighth of the entire area of Stamboul devoted to buildings.

These areas of destruction by fire give to Constantinople an appearance in some respects resembling that of European cities which were partially destroyed in the war. There is, however, this difference. In the war-wrecked cities of Europe—with some exceptions—walls of buildings are still standing; in Constantinople there are whole blocks in which so little stone or brick was used in construction that one looks across an almost open space.

What About Rebuilding?

At first thought one wonders that almost nothing has been done in the way of rebuilding. Here, again, several causes have contributed to the same result. It must not be forgotten that in the years preceding the Great War, conditions in Turkey were much disturbed, first by revolution, then by the Italian and Balkan wars. In the meantime the costs of materials and construction have so increased that, according to the estimate of an expert, about half the owners of the real estate in the fire-swept districts are quite unable to raise the money needed for rebuilding. But if the requisite capital were at hand, it is by no means certain that rebuilding would now be resumed, because of extreme uncertainty in regard to the future administration and development of the city, and the lack of a definite plan.

The destruction of habitations in Constantinople has been accompanied by a notable increase in population. In 1908 the number of inhabitants was estimated as more than 800,000 but less than 900,000. No exact statistics are available, but conservative computations place the total number of inhabitants at the present time at

RAMSHACKLE WOODEN CONSTRUCTION TYPICAL OF CONSTANTINOPLE

When a blaze starts in a tinder pile like this, it is almost impossible to prevent its becoming a conflagration

PLAN OF CONSTANTINOPLE - SCUTARI
KADI-KEUÏ BY ALEXANDRE M. RAYMOND Architect
PLAN DE CONSTANTINOPLE
SCUTARI - KADI-KEUI PAR ALEXANDRE M. RAYMOND Architecte
GALATA
PERA
GOLDEN HORN
SERASKIAT
SEA OF MARMARA
PROPONTIS

about 1,200,000, though it is suggested that the total may run as high as 1,250,000. The city is crowded with refugees and foreigners.

The resulting condition has brought indescribable hardships to the people of the city. While the population has increased 30 per cent or more, its housing accommodations have been reduced, on a conservative estimate, at least 15 per cent below the total of 1908. The congestion of living and of street traffic is almost unbelievable to one who has not seen it.

In consequence, Constantinople, instead of being, as in times past, one of the cheapest cities in the world to live in, is now more expensive than any other capital that I have lately visited; to be specific, living is here more costly than in London, Paris, Athens, Rome, Bucharest, Sofia, Damascus, or even Jerusalem and Cairo. In what degree the high cost of living in Constantinople is due to profiteering I do not know; but it is not necessary to attribute wholly to profiteering the excessive cost of living here at this time, in view of the demand for quarters to live in and the cutting off of the supplies from Asia Minor.

From the point of view of the future, the burned areas of Constantinople are an asset of incomparable value and interest. The great fires of the last century in American cities furnish no proper parallel. These cities were of modern growth, with broad and regular streets, and in most cases had an adequate system of sewers and watermains. With the exception of a comparatively small area, therefore, it was possible in rebuilding to follow old street lines.

Here in Constantinople, on the contrary, one finds almost virgin soil for city planning. In the unburnt portions of the city a large part of the construction still remains of the most temporary character, and the development of public utilities is far behind the requirements of the population. On account of its commercial and political relations, and its advantages of location, at the crossing of two intercontinental trade routes—an east-and-west land route connecting Europe and Asia, and a great water route north and south—this center of population, under proper governmental administration, must rank among the most important in the world.

If only a far-sighted and liberal public policy can be worked out and given legal sanction, it presents the most extraordinary opportunity of the ages to build a metropolitan city in the light of the experience and knowledge which the centuries of civic development, and the recent decades of intensive study of city planning, place at the service of the expert.

Results of Government Housing in Canada

UNDER the provisions of the Canadian Housing Act, dated December 3, 1918, and recorded in THE AMERICAN CITY in April, 1919, the sum of $25,000,000 was allotted to housing loans to the provinces. In a report by the Department of Health of the Dominion, under whose jurisdiction the housing problem is handled, the unexpended amount available as of March 31, 1921, was $10,455,000. Eight of the provincial governments had at that time adopted the act providing for the acceptance of the loan for the erection of dwelling places. These were Prince Edward Island, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, and British Columbia. Alberta had not then acted. The amount of the Federal loan actually borrowed by the provinces up to March 31, 1921, was $14,545,000, and the total number of houses erected 3,691. It was expected that 1,496 additional houses would be built during the remainder of 1921. The provinces advanced to the municipalities $12,547,435 out of the Federal loan, while the total sum allotted to the municipalities reached $19,916,503. The amount was far below the applications for loans, which amounted to $34,522,897. Official reports received from the provincial housing authorities indicated that 171 municipalities had taken action, as shown by the following table:

Province	No. of Mu'palities That Have Taken Action	No. of Houses Built	Amount of Advance Made
Ontario	72	2,344	$ 8,750,000
Manitoba	18	525	1,580,000
British Columbia	27	359	1,361,500
Quebec	34	263	1,033,500
Nova Scotia	6	93	600,000
New Brunswick	14	107	1,220,000
Total	171	3,691	$14,545,000

The Fire Hazard of Radio

A Problem Which Must Receive the Serious Consideration of Fire Officials, Particularly with the Present Thunder-Storm Season

WITH at least 750,000 radio sets now in active use throughout the United States, the majority of them in private homes, and with the ranks of the fans constantly increasing, all records for the popularizing of a new scientific discovery have been swiftly eclipsed. Like many other inventions, radio telephony has introduced a new fire hazard which must be recognized by fire officials.

No longer ago than last November only a few thousand receiving sets were in use. These were experimental affairs, playthings almost exclusively of the younger generation. Lacking authoritative instruction, amateurs installed these sets in many different ways, each one setting up his antennae according to his individual knowledge. Moreover, but slight regard was paid to the hazards incident to installation, especially the danger of fire arising from the attraction of lightning. Along with the astounding growth of interest in the subject, therefore, has come a need for regulation, with a view to removing such dangers as exist and to standardizing the installation so that the spread of radio for utilitarian, educational and entertainment purposes may continue with a maximum of efficiency and safety.

It is perhaps natural, considering the remarkably short time in which interest in the subject has grown, that potential fire hazards should be ignored or overlooked by the public and fire officials. Even where some realization of possible danger has existed, inquiries have been met for the most part with misinformation, unintentional, it may be, but none the less harmful. Among the legion of writers on topics related to the radio, a few have indeed consulted the current edition of the National Electrical Code, prepared by the National Fire Protection Association and approved and issued by the National Board of Fire Underwriters. But these requirements, promulgated in 1920, were based largely upon the hazards incident to the equipment of wireless telegraph transmitting stations where antennae of considerable height and length were used and where the hazard of high potential equipment had to be taken into account. In 1920 the wireless telephone had not yet begun to be really domesticated.

One of the fire hazards lies in the inclination of those interested to experiment with lighting circuits and other high voltage systems. It is reported that not long ago three children in Aiken, S. C., were burned to death in a fire resulting from a short circuit in a radio transformer. A New Jersey boy carelessly crossed the leads from his storage battery and started a fire that might have become serious if it had not been promptly detected. It is because of such dangers that the National Electrical Code requires all wiring to be in accordance with the class of installation. The work should always be inspected before being placed in service.

In order that the Electrical Code may be kept abreast of the latest development in electrical science in its more practical aspects, it is habitually revised at two-year intervals. The spreading popularity of the radiophone made it necessary to revise that part of the code which relates to receiving and sending apparatus, and to make public the amendment at once to meet the emergency that has arisen. These revisions, it should be said, are in themselves tentative and subject to possible further amendment before they are incorporated in the next published issue of the Code.

The specifications have been drawn up by a special committee of the National Fire Protection Association, whose findings are viewed as standards of engineering practice. Besides the underwriting organizations represented on this body, engineers acting for the American Radio Relay League, the American Telephone and Telegraph Company, the Radio Corporation of America, and the Independent Telephone Association participated.

What City Officials Should Do

Every municipal official interested in the fire hazards of his city should secure a copy of the suggested specifications from the National Board of Fire Underwriters, 76 William Street, New York City, and see to it that these specifications are lived up to throughout the city, either incorporating them as an ordinance or seeing that they are published locally for the information and instruction of their citizens.

It is true that the lightning hazard is eliminated when indoor antennae are used and that outdoor aerials may be rendered reasonably safe by establishing proper ground connections and installing an approved lightning arrester. But these take care of only one source of danger. Other fire hazards remain. Many people do not realize that the 6-volt storage battery, such as numbers of enthusiasts are using to light the filaments of their electron tubes, is capable of starting a serious fire. It has done so more than once. Recharging such a battery from the electric lighting current in the home adds also to the risk of fire, as have recent ill-considered attempts to receive messages via the house lighting circuit. The presence of radio apparatus with its necessary wiring, installed more often than not without expert advice, increases the potential hazard of crossed wires already existing from lighting installations.

Municipal ordinances should require that every amateur receiving station should be set up in accordance with the new regulations and inspected by the underwriting organization having local jurisdiction, as soon after installation as possible, and should be altered to meet the recommendations of the organization. Fire insurance policyholders are aware, of course, that according to the terms of their contracts, alterations in the status of the risk, such as increase in the hazard made without the consent of the insurer, automatically void the policy.

Man-made Malaria

Fighting a Menace to the Health of the Country

THE task of eradicating malaria has been made doubly hard by the continual creation of fresh mosquito-breeding spots by impounding water either intentionally or unintentionally, as in the course of highway or railway construction. Owing to this, a considerable portion of the malaria in the country may be termed "man-made." Assistant Surgeon-General Carter, U. S. Public Health Service, found that probably three-fourths of the malaria in a district in eastern Virginia came from such artificial pools and swamps.

Man-made malaria is of special importance at present because of the recently enacted Federal Highways Act, which provides many million dollars for building additional good roads in the South. The specifications require that the culverts on these roads shall be so placed that they will completely drain all wet areas above the culvert entrance and that all borrow-pits or excavations made along the roadways shall be filled or properly drained. Many Southern States have enacted laws of similar purpose.

It is of the utmost importance to the public health that these state laws and Federal regulations shall be faithfully observed while the roads are being built, for at that time adequate drainage can be had with very little, if any, additional cost; whereas, if through carelessness or wilfulness the culverts are placed too high or the borrow-pits are not properly drained, the expense for later rectifications may be very great.

The State Highway Engineer of Alabama recently strongly appealed to all state and county engineers and road officials to cooperate in carrying out these laws and regulations. Every community in the South should take particular interest in this subject, and all good citizens should promptly report the whereabouts of any such disease-breeding spots that are being created in their vicinity, and should insist on their eradication. Not to do so will inevitably mean more mosquitoes and more malaria about their homes.

No road, however necessary for travel, can be called good if it interferes with proper drainage.

CHARLES RECH, PLAYGROUND MARBLE CHAMPION OF JERSEY CITY, AND THE WINNERS OF OTHER PLAYGROUND CONTESTS, WHOM HE DEFEATED

Playground Marble Contests Help Build Character

By A. Harry Moore

Director of Parks and Public Buildings, Jersey City, N. J.

WHILE visiting one of the playgrounds in Jersey City recently, I chanced to overhear two little boys wrangling over a game of marbles. They had been playing for quite a while, and one had lost many of his prize marbles. The winner was the best shot, but the loser was doubling the stakes with the hope of getting back what he had lost.

It was then that I decided that marbles, as it was being played, was not an ideal game for any boy, and the thought ran through my mind—why not play for honors instead of marbles, and in this way take the sting of gambling out of the game?

I talked the plan over with the Supervisor of Playgrounds. We then called a meeting of the playground instructors and drew up a set of rules, and the contests were started in sixteen playgrounds in Jersey City. Five thousand boys entered. We had them enter just as they would an athletic contest, by signing an entry blank and turning it over to the instructor of the playground nearest their home. These entry blanks were then filed and the eliminations were started.

We did not look for much success at the start, but as the contests continued, the boys soon forgot their lust for the other fellows' marbles and were fighting hard to win the chance to play for the championship of Jersey City. Then came the finals, and sixteen lads lined up for the honors and a chance to be hailed as the marble-shooting champion of Jersey City.

The interest in the game became widespread. Fathers and mothers of the lads came to Pershing Field. Hundreds of boys from the sixteen playgrounds came flocking

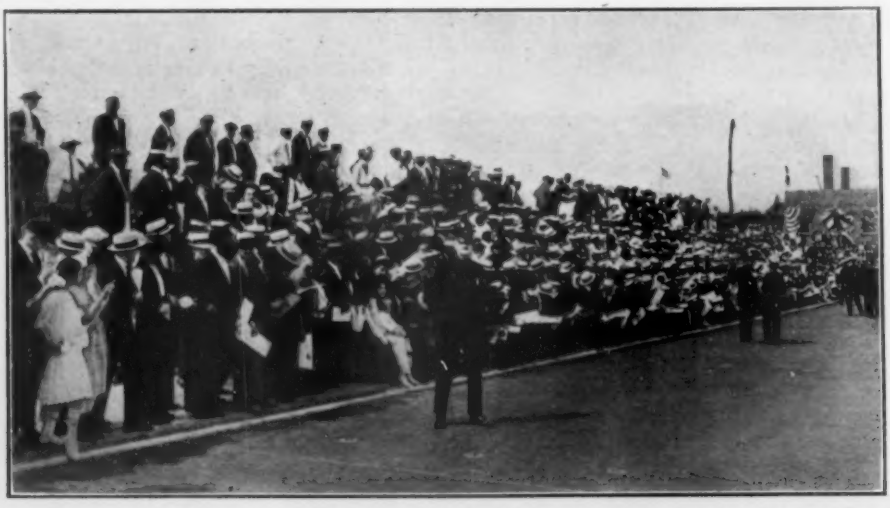
to the big field to cheer for their respective shooters.

Charles Rech, a fourteen-year-old boy, large for his age but nevertheless a regular playground lad, was the final winner. Several of the other lads gave him a great battle, but he finally put them out and was received by all as the first and only marble-shooting champion in the country to-day. He was presented with a gold medal by the local Rotary Club, and the fifteen playground champions received silver medals.

Champion Rech did not have long to wait before a worthy opponent issued a challenge. Marbles had attracted President Harding, senators, congressmen, and other men of national fame at the national capital. The playground children of Washington started a contest, in which Michael Tariano was the final winner. The Washington star came to Jersey City with his manager and a number of his Washington friends. Ten thousand people witnessed this contest. Pershing Field was decorated with flags and bunting. Movie men were there by the score. Governor Edwards of New Jersey was an interested spectator. After a forty-five-minute battle, Rech finally won, and again was hailed as the world's champion. He has played many games since and has yet to taste defeat. He recently issued a challenge to the boys of the world, via the wireless route, that was heard in lower California and also in Alaska.

In getting the boys to play for honors they are being taught true sportsmanship. They are getting their first lesson in the game of clean athletics; they are being taken from the gambling side of the game and made to realize that honor and glory amount to more than wrangling and fighting over a few marbles that a fellow may win. It is teaching the boy to fight fair.

The rules, as adopted in Jersey City, call for a small ring to be placed in the center of a plot of ground. In this ring are placed the stakes, one marble for each of the players. Every player must furnish his own stakes. When the marbles have been placed in the circle, the contestants then stand at a line marked off 25 feet distant, and toss their shooting marbles. The boy tossing nearest the circle, or "fat," as it is termed by the Jersey City boys, gets the first shot. He must knock a marble out of the fat before he is given the chance of taking a crack at one of his opponents. If he knocks a marble from the fat, and then hits the shooting marble of one of the players, that particular player is out of the game. Every shooter must first knock a marble from the fat before he is allowed to try for a hit at some other fellow's shooter. In this way, the game narrows down to two players, and they jockey about the fat until one or the other is knocked out of the game and the winner is declared the champion.



PART OF THE CROWD THAT CAME TO SEE THE CHAMPIONSHIP CONTEST IN JERSEY CITY

Street Paving Methods in Providence, Rhode Island

Old Stone and Concrete Bases Used on Heavy-Traffic Streets

By M. H. Bronsdon
City Engineer, Providence, R. I.

THERE are 130,692.2 square yards, or 39,200 linear feet, of street of average width of bituminous pavement, including sheet asphalt, Warrenite and bitulithic pavement, laid upon rolled stone or water-bound macadam base, in Providence, R. I. The pavement is in the very best of condition and gives every indication of being as satisfactory as any pavement which we have laid. The rolled stone type of base is being used on streets classified as "medium traffic," where a 10-ton steam roller can be operated during construction. Between the tracks of the street railway company, a concrete base is being laid, owing to the fact that it is impossible to satisfactorily use a roller at these locations.

FRANKLIN STREET FROM WESTMINSTER TO WASHINGTON, PROVIDENCE, R. I., SHOWING SHEET ASPHALT PAVEMENT ON ROLLED STONE BASE

The 22,584 yards of sheet asphalt laid during the season of 1921 was laid either upon a concrete base in locations inaccessible to the roller, or upon a pentrated base laid in two courses each 3 inches thick, the lower course being bound with crusher screenings, and the upper course penetrated with Texaco 96 asphalt. The rolled stone base is favored because streets laid six years ago with this type of base show scarcely any cracks in the surface, and the traffic has increased so that now there is a large percentage of loaded 5-ton trucks passing over it. Another advantage in the use of a rolled stone base is that the time required for the total construction of the pavement is less than with any other type of base, and it is believed that the rolled stone type is just as permanent and reliable as concrete, black base or penetrated base.

The following specifications are used in Providence for laying a rolled stone or macadam base:

General Description.—The base shall consist of two courses of mineral aggregate, each course composed of specified coarse aggregate and screenings, and each course shall have a compacted thickness of not less than 3 inches. The two courses when completed shall form a foundation having a compacted thick-

ness of not less than 6 inches and shall then conform to a plane 3 inches below the finished grade as shown on the plans of the city engineer.

Excavation.—The roadway to be paved shall be excavated to a plane not less than 9 inches below finished grade, the excavation being made by the removal of existing pavement, subsoil, concrete base, or anything that might interfere with the construction of a satisfactory rolled stone base or foundation. All soft or spongy places in the subbase shall be dug out and the material removed to the dump.

Wherever it is found necessary to excavate to a plane deeper than 9 inches below finished grade, gravel or other suitable material may be placed in layers not to exceed 3 inches in thickness and rolled to the satisfaction of the city engineer and until the subbase is brought to approximately 9 inches below finished grade.

Materials.—The mineral aggregate shall be broken stone and stone dust from one of the quarries, as follows, after selection has been made and so stated by the contractor in his bid:

The New Haven Trap Rock Company
Connecticut Trap Rock Quarries Company
Plantations Construction Company
Providence Crushed Stone & Sand Company

The coarse aggregate shall be in pieces as nearly cubical as possible, and stone containing an excess of flat or elongated pieces, splinters, or slabs will be rejected.

The stone dust or screenings shall all pass a ¼-inch screen. The coarse aggregate shall all pass a 2½-inch ring and be retained on a 1½-inch ring. If accepted, 1¼-inch stone shall all pass a 1½-inch ring and be retained on a ¾-inch ring.

Construction.—The contractor, in addition to excavating and preparing the roadway, shall remove and dispose of all waste material at dumps which he shall find or provide. Granite block or other paving removed during excavating, that may be of future use to the city or other owners, shall be delivered and piled by the contractor at sites or locations which will be specified to the contractor before excavation is undertaken.

The coarse aggregate shall be spread upon the prepared subgrade in a uniform loose layer of correct depth from piles dumped by trucks on platforms or by means of approved spreading wagons.

In no case shall the material be dumped directly in place. Suitable precaution shall be taken to prevent rutting of the subgrade during delivery and spreading of the coarse aggregate.

The coarse aggregate shall not be spread upon a wet subgrade, nor shall more be spread at one time than an average day's work in advance of rolling and filling.

Compacting and Filling Coarse Aggregate.—After excavation and preparation of the roadway and subbase as called for above, the mineral aggregate of the first course shall be evenly spread in a layer of such depth or thickness that after compacting by rolling, the surface of the same shall be at a plane uniformly 6 inches below the finished grade of the pavement as called for on plans of the city engineer.

The coarse aggregate shall be rolled with a 8-wheel power-driven roller weighing not less than 10 tons, the rolling to continue until the coarse aggregate has been thoroughly compacted to a firm, even surface. Rolling shall start longitudinally at the sides and gradually proceed toward the center of the roadway, overlapping all successive trips by approximately one-half the width of a rear roller, and shall continue until the aggregate does not creep or wave under the weight of the roller.

After the first course has been rolled to the satisfaction of the city engineer, stone dust or screenings shall be spread with shovels from piles located along the sidewalk. The stone dust or screenings shall be placed in thin layers and worked into voids by the use of hand brooms and by rolling, without the use of water, until no more can be forced into the interstices or between the coarse aggregate. During rolling, additional screenings shall be spread in thin layers where bare spots appear and shall be broomed off all spots or places where an excess of stone dust or screenings has been applied.

Stone dust or screenings shall be used only in such quantities as required to fill the voids and leave no surplus on the surface, after rolling is completed.

Second Course.—After the first course has been prepared as above, the second course of coarse aggregate shall be spread evenly over the compacted first course, of such depth that, after compacting by rolling, the surface of the same shall be at a plane 3 inches below finished grade as called for by plans of the city engineer. Stone dust or screenings shall then be applied and spread with shovels from piles located along the sidewalk in thin layers and worked into the voids by the use of hand brooms and by rolling without the use of water until no more can be forced into the interstices or between the coarse aggregate.

During rolling, additional stone dust or screenings shall be spread in thin layers wherever bare spots appear and shall be broomed off all spots or places where an excess of stone dust or screenings has been applied, it being the intention of using only such an amount of stone dust or screenings as will be required to fill the voids and leave no surplus on the surface after rolling is completed.

After the second course has been prepared, as called for above, the surface shall then be sprinkled with water and rolling again continued, the sprinkling to be in such quantity only as will settle the stone dust or screenings into the interstices or voids in the coarse aggregate, but not in such quantity that water will find its way into the base course. If through neglect or otherwise, water finds its way through the coarse aggregate into the subgrade and the coarse aggregate moves or waves under the roller, the contractor shall excavate all such places, and after excavating is finished shall fill up the same in layers and roll as called for above where soft spots appear.

Condition Prior to Laying Surface Course.—If, at any time prior to laying the surface course of pavement, the subgrade material becomes churned up or mixed with the base course materials, such mixture shall be dug up and removed at all such places and the subgrade shall then be reshaped and compacted and the base relaid and filled with clean aggregate and properly compacted.

If any irregularities develop in the surface of the base at any time during construction, they shall be remedied by loosening the surface and removing or adding coarse aggregate as may be required, after which the entire area, including the surrounding surface, shall be rolled, with the addition of screenings and water, until it is compacted satisfactorily to a uniform surface; all of which is to be performed in accordance with the details mentioned above.

Immediately before the laying of the surface course, the base course shall be cleared or cleaned of all loose or caked dust or screenings, dirt or any material that might interfere with the construction of a satisfactory pavement, and the entire surface left so as to present a uniformly rough or granular appearance admitting of complete bond with the surface course.

Where the Road Money Came From

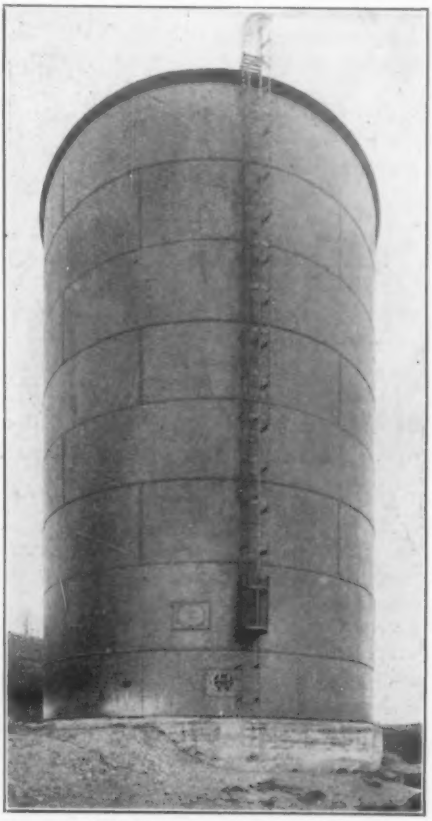
The United States spent $600,000,000 for roads in 1921, according to estimates of the Bureau of Public Roads, United States Department of Agriculture. This sum was derived from the following sources: local road bonds, 33 per cent; county, township, and district taxes assessments, and appropriations, 14 per cent; state taxes and appropriations, 12 per cent; state road bonds, 7 per cent; motor vehicle license revenues, 19 per cent; Federal Aid, 14 per cent; and miscellaneous sources, 1 per cent.

Water Storage in Johnstown, Pa.

Elevated Tanks and Water-Tower Solve Problem of Supplying Water at Suitable Pressure to City and Hilly Suburbs

THE city of Johnstown, Pa., lies in a valley at an approximate elevation of 1,165 feet, but 25 per cent of the water consumers are located in suburbs on the hills at elevations varying from 1,400 to 1,750 feet. The Johnstown Water Company is at present carrying out a rather extensive program of steel tank construction to enable it to supply water at suitable pressures to all districts.

The main water-supply comes from five reservoirs located on various streams near the city. The water flows by gravity into the city proper, satisfactorily serving elevations up to and including 1,280 feet. From here it is boosted by auxiliary pumping stations to tanks or stand-pipes on the hills, from which it flows by gravity to the consumers located in that district. Each of these tanks serves as a complete and separate distribution system.



A STAND-PIPE OF 285,000 GALLONS CAPACITY

A 250,000-GALLON TANK

The elevated steel tank shown in the first illustration was erected last year for the Johnstown Water Company by the Pittsburgh-Des Moines Steel Company. This tank has a capacity of 250,000 gallons and is elevated 65 feet above the ground level. An unusual feature of the town is that the columns are of different lengths. The tank is located on a steep hillside, and in order to obviate as much excavation in solid rock as possible, the tower supports were built

to fit the contour of the ground. This tank serves the suburbs of Westmont, Southmont, Elim and Brownstown.

The second illustration shows a steel water-tower, built last year by the same company. This is of the stand-pipe type, as the hillside on which it is built furnishes the necessary elevation. The tank has a capacity of 285,000 gallons and serves the Roxbury and Ferndale districts.

Plans for the remainder of this year call for the erection of three additional standpipes of large capacity to increase the supply for the Prospect, Moxham and Dale districts.

Because of the various elevations of the districts served, it is not economical to operate a central pumping station from which all districts can be supplied. This makes it necessary to operate seven different stations, the water-supply being taken from the gravity system at a head of approximately 100 feet and boosted with centrifugal pumps to the tanks on the high levels. The maximum capacity of the pumps is 600 gallons per minute each. The operation is so arranged that not more than three of these stations are running at the same time. All pumping is done between the hours of 6 P. M. and 6 A. M. when the peak load on the gravity system is lowest and when a decided decrease in the power rates is obtained, thus greatly lowering the operating costs.

The Soot Burden on American Cities

It Is Measured in Tons per Acre, Not Collars per Day

By Rudolf Kudlich

Assistant to the Chief Mechanical Engineer, U. S. Bureau of Mines

A SMOKE survey of Salt Lake City, conducted by the United States Bureau of Mines in 1920 in cooperation with the University of Utah of Salt Lake City, showed that the soot fall for that year averaged 349 tons per square mile per year, the average annual concentration being from 200 tons per square mile in the residential section to 798 tons in the business district near the railroad yards. A survey conducted the following year to determine the progress which had been made in smoke abatement showed that the concentration of soot had been decreased about one-third. A survey of smoke conditions in Grafton, W. Va., is also being made by the Bureau of Mines, but the results are not yet available.

The Mellon Institute of Pittsburgh in 1912 conducted a smoke survey of the city of Pittsburgh and the surrounding country, which showed that the annual soot fall varied from a minimum of 595 tons per square mile in the high residential district to a maximum of 1,950 tons per square mile in the low-lying mill districts along the Ohio River. The average fall over the entire district surveyed was 1,032 tons per square mile per year.

Another survey was made of the soot fall in St. Louis, which showed a minimum of 506 tons per square mile per annum in the high residential district and 1,247 tons per square mile along the river front, with an average of 812 tons.

A smoke survey was also made in Chicago in 1914, which revealed quite high smoke concentration, but no record of soot fall was made.

Note.—Published by permission of the Director of the U. S. Bureau of Mines.

Types of City Paving

In our cities the original water-bound macadam and gravel roads have for the most part given way to higher types of construction, until to-day they constitute an average of only about 26 per cent of the total yardage. The three most widely used city types are asphalt, brick and stone block. If we eliminate the water-bound pavements, we find that of the higher city types, asphalt constitutes about 55 per cent, brick about 19 per cent, and stone block about 14 per cent, giving a total of 88 per cent for these three types.

—Prevost Hubbard, *Chemical Engineer.*

A Temporary Substitute for a Swimming Pool

By Claude A. Allen
Superintendent of Recreation, Elizabeth, N. J.

BY installing municipal shower-baths, Elizabeth, N. J., like New York City, has been successful in providing a new form of recreation for the children, many of whom live in cramped quarters where there are very poor facilities for bathing, and where trips to the beach are seldom possible. While it is not possible for children to learn to swim under the municipal shower, and it is acknowledged to be only a temporary substitute for a swimming pool, it affords great relief during the torrid days of summer for those that are unable to reach a swimming pool or the seashore.

EFFECTIVE, INEXPENSIVE STREET SHOWER, ELIZABETH, N. J.

Walter H. Baldwin, President of the Recreation Commission in Elizabeth, has had the idea of street showers in mind for a number of years, but only last year did it become a reality.

Before installing the showers, it was first necessary to lay the plan before the Mayor, who promptly gave it his hearty indorsement and encouragement. The next step was to get permission for the use of the street from the Board of Works. This readily accomplished, the Chief of the Fire Department was next visited and asked to supply fire hose and Bresnan distributors (which are used by the Fire Department in cellar fires, and are commonly called "cellar nozzles"). The final step was to plan something that would hold the hose and distributor in the air for a height of about 8 or 10 feet. The writer applied the idea of an oil derrick to this need and, with the cooperation of the Manual Training Department of the public schools, had a miniature derrick constructed 8 feet in height, which offered a suitable support for the distributor and allowed the water, under full pressure, to be sprayed for a radius of about 20 feet. Thus, four departments of the city cooperated in this service for the children—the Recreation Commission, the Fire Department, the Executive Department, and the Vocational School.

The first shower was erected at fire headquarters without formal announcement. Mayor Victor Mravlag, of Elizabeth, and President Baldwin of the Recreation

Commission, were on hand to see the shower in operation. In a few minutes after the installation, the street swarmed with children of various nationalities. Boys and girls from families in comfortable circumstances and others from homes where prosperity is a stranger were there, which shows that the new form is democratic. Many types of bathing outfits were in evidence during the season, and ranged in style from Fifth Avenue almost back to the Garden of Eden, the one-piece suit being the most fashionable for the boys and girls.

The municipal shower met with such pronounced success and was such a welcome innovation to this industrial city, where, in some sections, the children live in very cramped quarters, that the Recreation Commission plans for the installation of several during the present summer. Another step in advance will be attempted by providing a basin about 10 or 12 feet square under the shower in which the children can splash about.

There is really no reason why every town and city in the country cannot provide this form of recreation, not only for the children, but for adults as well, the expense being practically nil compared with the benefits and advantages gained. In Elizabeth, our showers cost the meager sum of $4.28 each, this representing the mere price of the lumber. In some sections this material could be secured gratis, making this new service possible by spending nothing more than time and thereby affording happiness, cleanliness, and relief that cannot be measured in dollars and cents.

The apparatus used in New York City was more expensive, more elaborate, and of a more permanent design, but neither was in need of any special facilities for being placed in operation. A fire hydrant and the bare street, combined with the shower, obtained for the children the desired relief. Many requests were received from adults to have the bathing continued in the evening, so that grimy, perspiring workers might be refreshed after a day's labor in a sweltering temperature of 90 degrees or over.

This practice helps not only to foster the communal idea, but to teach the health value as well as the comfort of bathing, to many whose ablutions are far too infrequent.

ELIZABETH'S SUBSTITUTE FOR THE "OLD SWIMMIN' HOLE" DRAWS THE SAME KIND OF KIDS

ACKNOWLEDGMENT.—From the *Journal* of the American Association for Promoting Hygiene and Public Baths.

Health education seeks to insure to each individual his maximum contribution to the world.—*Dr. J. Mace Andress.*

What Is a Fair Salary for a City Engineer?

FOLLOWING the publication of the data on the salaries of fire chiefs and city clerks, THE AMERICAN CITY sent a questionnaire to city engineers throughout the country. Two hundred and sixty-one responded, as shown in the accompanying list.

In many of the municipalities the city engineer serves also as commissioner of public works or as superintendent of the water or light department, or both. In some places the city manager himself serves as the city engineer. In such cases we are in danger of comparing a city manager's salary with that of a city engineer. To obviate this difficulty, the mark X has been placed after the salary of each city engineer in the list who serves in some other capacity also and whose total salary is entered, as in many cases no division of salary was indicated.

It is interesting to note that out of the 261 cases reported, the salary of $250 per month is reported most often, on 27 occasions. Next in numerical order is the figure $200 per month, with 18 replies; $150, $300 and $416.66 per month, with 12 replies each, and $333.33 per month, with 11 replies. The salaries vary so widely that an average does not mean a great deal. At the one extreme lies Salem, Ohio, where the city engineer receives $80 per month, a salary which has not been increased in 25 years, and at the other extreme lies a city of 500,000 population where the city engineer is paid $15,000 per year. When grouped, the following facts are revealed:

City engineers paid by percentage of contract	14
City engineers paid by fees and miscellaneous methods	8
City engineers paid on a per diem basis	37
City engineers paid fixed salaries of $1,200 and under	11
City engineers paid fixed salaries of $1,201 to $1,800	21
City engineers paid fixed salaries of $1,801 to $2,400	32
City Engineers paid fixed salaries of $2,401 to $3,000	50
City engineers paid fixed salaries of $3,001 to $3,600	23
City engineers paid fixed salaries of $3,601 to $4,800	21
City engineers paid fixed salaries of $4,801 to $6,000	21
City engineers paid fixed salaries of $6,001 to $9,000	8
City engineers paid fixed salaries of $9,001 to $15,000	2

Among the larger cities reporting, San Francisco leads with $1,250 per month; Waterbury, Conn., is second, with $1,000. Then follow: Boston, with $750; St. Louis, with $666.66; Indianapolis, Baltimore, Richmond, Va., and Seattle, each with $625; Newark, N. J., and Buffalo, with $583.33; Hartford, Conn., Jersey City, Syracuse, Yonkers, Cincinnati and Pittsburgh, with $500; Cleveland, with $483.33; Kansas City, Mo., and Providence, R. I., with $458.33; Los Angeles, New Orleans, Worcester, Mass., St. Paul, Albany, N. Y., Lakewood, Ohio, Portland, Ore., Memphis, Tenn., Milwaukee, and Alma, Mich., with $416.66; St. Joseph, Mo., with $400; Akron, Ohio, and Washington, N. C., with $375; and Fall River, Mass., with $362.50.

A great many of the engineers in the smaller cities are paid on the per diem basis for such time as may be required. Some receive a fixed percentage of all improvements; some receive a percentage which varies according to the kind of improvement done; others are paid at a flat rate per linear foot. The percentages vary from 2 to 7, the prevailing figure being 5 per cent. On the per diem basis, the prevailing figure seems to be $10, although 7 cities report as low as $5, and 6 as high as $15. Massachusetts cities seem to be fairly consistent, Boston, the largest, paying $750 per month and providing an automobile, although Haverhill, the seventh in size, pays the lowest salary recorded for that state. The province of Ontario likewise has a fairly even scale, ranging from $225 per month up to $333, according to the size of the community.

Some of the city engineers are allowed additional sums for transportation, as in the case of Baltimore, Md., and Hartford, Conn., which last year provided an allowance of $2,000 and $600, respectively. In Brainerd, Minn., out of a salary of $2,500 per year, the city engineer is expected to furnish and pay the expenses of a Ford car. At New Prague, Minn., the city engineer reports $150 per month for a 10-hour day. At Carmen, Mo., the city engineer is paid on the basis of 50 cents per hour for the time required. These latter figures speak for themselves and need no comment.

Unless otherwise indicated, the salary figures are on a monthly basis. Salary paid only for time actually required is shown thus: per month—m; per day—d. When city engineer serves in other capacities also, total salary is given and marked x.

City and State	Population	Over 10,000	Under 10,000
ALABAMA			
Birmingham	178,270	$416.66	
Selma	15,607	150	
ARKANSAS			
Little Rock	65,030	215	
CALIFORNIA			
Chico	8,872		$100
Fullerton	....		10 d
Merced	3,974		20c per linear ft. paving
Modesto	9,241		200
Los Angeles	576,673	416.66	
Oakdale	....		15 d
Oakland	216,361	375 and auto	
Ontario	7,280		250x 25 m expense of auto
Oroville	3,340		5 per yr. 10 d
Palo Alto	5,900		275
Redlands	9,571		350
San Diego	74,683	300x	
San Francisco	508,410	1,250	
Santa Barbara	19,441	225	
Vallejo	16,853	300	
COLORADO			
Buena Vista	....		fees only
Colorado Springs	29,572	350	
Leadville	4,959		10 d
Pueblo	42,908	206.66	
CONNECTICUT			
Hartford	138,036	500 50 transportation	
Naugatuck	15,051	166.66	
New Haven	162,519	333.33	
Waterbury	91,410	1,000	
DELAWARE			
Wilmington	110,168	300	
FLORIDA			
Arcadia	3,479		250
Sanford	5,588		12 d
IDAHO			
Boise	21,393	168.50	
Pavetta	....		Per diem or 5% on contracts
ILLINOIS			
Canton	10,928	10 d	
East Moline	8,675		250x
Galva	2,974		2%
Kewanee	16,026	250	
Metropolis	5,055		per diem
Normal	5,143		5% on all improvements
Rockford	65,651	208.33	
INDIANA			
Bloomington	11,595	83.33	
Covington	....		Piece work one charge for each job
Crawfordsville	10,139	125	
Crown Point	3,232		8 d
Elkhart	24,277	150 and fees	
Gary	56,378	333.33	
Huntington	14,000	125	
Indianapolis	314,194	625	
Jasper	2,539		4% of contract price
Lafayette	22,486	150	
Linton	5,845		5 m and 5 d
Peru	12,561	125	
Shelbyville	9,701		83.33
South Bend	70,983	250	
IOWA			
Atlantic	5,329		5% on improvements
Cresco	3,195		10 d
Glenwood	3,862		10 d and expenses
Indianola	3,628		8 d 5 winter months 10 d 7 months
Keokuk	14,423	165	
Muscatine	16,068	150 and 350 per yr. for transportation	
Rock Rapids	2,172		3 to 5% of cost of job
Sheldon	3,488		7% on sewers, 4% paving, other work 10 d and expenses
KANSAS			
Emporia	11,273	200x	
Fredonia	3,954		125
Iola	8,513		100
Kansas City	101,177	250	
McPherson	4,595		5 d
Minneapolis			3% on contract price
Neodesha	3,943		200
Parsons	16,028	175	
KENTUCKY			
Louisville	234,891	333.33	
Pikeville	2,110		30 year 10 d
LOUISIANA			
New Orleans	387,408	416.66	
MAINE			
Fort Kent	4,237		300
Lewiston	31,707	41.66 and office rent	
Old Town	6,630		12 d
Rockland	8,109		6 d
MARYLAND			
Baltimore	733,926	625 and 166.66 for expenses	
Easton	3,442		15 d
MASSACHUSETTS			
Boston	748,060	750 and auto	
Brockton	66,138	250	
Fall River	120,485	362.50	
Fitchburg	41,013	291.66x	
Haverhill	53,884	191.66	
Lawrence	94,270	229.16	
Lowell	112,759	350	
Melrose	18,204	229.16x	
New Bedford	121,217	316.66	
Newton	46,054	312.50	
Winchester	10,391	216.66	
Worcester	179,754	416.66	
MICHIGAN			
Alma	7,542		416.66x
Battle Creek	36,164	200	
Grand Rapids	137,634	275	
Hastings	5,132		204.16
Jackson	48,374	300	
Kalamazoo	48,858	333.33	
Negaunee	7,419		200
Niles	7,311		200
Pontiac	34,273	333.33	
Royal Oak	....		500x
Ypsilanti	7,413		260
MINNESOTA			
Albert Lea	8,056		200 and fees
Bemidji	7,086		250x
Brainerd	9,591		208.33 furnish car and upkeep
Duluth	98,917	291.66	
Eveleth	7,205		225
Faribault	11,080	250x	
New Prague	....		150
New Ulm	6,745		195
Pipestone	3,325		230
Rochester	13,722	350	
St. Paul	234,595	416.66	
Willmar	3,892		15 d and expenses
MISSOURI			
Boonville	4,665		5 d
Cameron	3,248		50c per hour
Excelsior Springs	4,167		5 d
Fulton	5,595		150x
Jefferson	14,490	250 furnish car & upkeep	
Kansas City	324,410	458.33	
St. Joseph	77,939	400x	
St. Louis	772,897	666.66 (Director of Streets and Sewers)	
MONTANA			
Bozeman	6,183		175
Havre	5,429		250
NEBRASKA			
David City	2,216		4.50 d
Lincoln	54,948	333.33	
Norfolk	8,634		225
Red Cloud	....		8 d
Sidney	2,582		25
University Place	4,112		4 d
Wayne	2,115		8 d
Wilber	....		175

City and State	Population	Over 10,000	Under 10,000
NEVADA			
Reno	12,016	250	
NEW HAMPSHIRE			
Concord	22,167	200	
Keene	11,210	200	
Nashua	28,379	150	
NEW JERSEY			
Jersey City	....	500	
Newark	....	583.33	
Newton	4,125		12 d
Paterson	135,866	291.66	
Ridgewood	7,540		225
Trenton	....	275	
Wallington	5,715		Piece work
NEW YORK			
Albany	....	416.66	and transportation
Auburn	36,192	291.66	
Binghamton	66,800	333.33	
Buffalo	....	583.33	
Carthage	4,320		10 d
Elmira	45,305	250	
Geneva	14,648	275	
Hudson	11,745	150	
Johnstown	10,908	150	
Oneonta	11,582	208.33	
Port Jervis	10,171	Piece work	
Syracuse	....	500	
Troy	72,013	333.33	
Wellsville	5,046		Fees
Yonkers	....	500	and 200 for transportation
NORTH CAROLINA			
Asheville	28,504	250	
Durham	21,719	300	
Mount Airy	4,753		200
Washington	6,314		375
NORTH DAKOTA			
Carrington	....		1 per hour
Langdon	1,228		50 and commission
OHIO			
Akron	....	375	and 50 for auto expense
Chardon	....		1 per hour and expenses
Cheviot	....		6% of total estimate
Chillicothe	15,831	125	
Cincinnati	....	500	
Cleveland	....	483.33	
Dayton	....	250	
Delaware	8,756		187.50x
East Liverpool	21,411	208.33	
Elyria	20 474	250	
Lakewood	41,732	416.66	
Lancaster	14,706	166.66	
Mansfield	27,824	200	
Marion	28,591	200	
Newark	26,718	150	
Oberlin	4,236		208.33
Salem	10,305	80 same for 25 years past	
Sandusky	22,897	200	
Wooster	8,204		150
Youngstown	....	320	
OKLAHOMA			
Altus	4,498		30 and fees
Chickasha	10,179	100	
Frederick	3,822		50 and 5% for all work over 500
Okmulgee	17,430	300	
Ponca City	7,051		Piece work
OREGON			
Eugene	10,593	200	
Pendleton	7,387		Piece work
Portland	258,288	416.66	
PENNSYLVANIA			
Ambridge	12,736	250	
Chambersburg	13,171	150	
Clairton	6,264		250
Doylestown	3,837		10 d and expenses
Duquesne	19,011	291.66	
Hanover	8,664		125
Lock Haven	8,557		125
Oil City	21,274	225x	
Parnassus	3,816		8 d office work, 10 d field work
Pittsburgh	....	500	
Perkasie	3,150		1 per hour
Rankin	7,301		210
Reading	....	300	
Tyrone	9,084		Fee and per diem
Uniontown	15,609	200	
Wilkinsburg	24,403	210	
RHODE ISLAND			
Providence	....	458.33	
SOUTH CAROLINA			
Orangeburg	7,290		333.33 furnish car and upkeep
Spartanburg	22,638	200	
SOUTH DAKOTA			
Brookings	3,924		10 d
Watertown	9,400		225
TENNESSEE			
Bristol	8,047		10 d
Cleveland	6,522		4% of all cost
Dayton	....		100 m
Harriman	4,019		5 d
Memphis	162,351	416.66	
Nashville	....	250	
TEXAS			
Beaumont	40,422	300	
Canadian	2,187		5%
Fort Worth	....	250	and transportation
Galveston	44,255	200	and expenses
Houston	....	416.66	and expenses
Mercedes	3,414		10% on $1,000 of work, 7½% on all over per month
San Antonio	....	350	
Stamford	3,704		250
Victoria	5,957		250
UTAH			
Lehi	3,078		15 d
Provo	10,303	175	
Salt Lake City	....	350	
VIRGINIA			
Newport News	35,596	300	
Richmond	....	625	
WASHINGTON			
Chehalis	4,558		19Cx
Seattle	....	625	
Spokane	....	300	and transportation
WASHINGTON, D. C.	....	250	
WEST VIRGINIA			
Charleston	39,608	283.33	
Parkersburg	20,039	150	
WISCONSIN			
Beloit	21,284	250	
Chilton	....		6% on contracts
Chippewa Falls	9,130		166.66
Delavan	3,016		175
Eau Claire	20,614	225 plus 60% of outside work	
Green Bay	31,017	250	
Janesville	18,293	300x	
Lake Geneva	2,632		7 d
Manitowoc	17,563	225	
Mayville	3,011		5 to 7% on contracts
Milwaukee	....	416.66	and 30 for expenses
Sparta	4,466		100
WYOMING			
Rawlins	3,960		15 d averaging 5 days month
Sheridan	9,175		125
CANADA			
ALBERTA			
Edmonton	58,627	325	
NEW BRUNSWICK			
Fredericton	8,081		250
ONTARIO			
Brantford	29,395	333.33	
Owen Sound	12,174	231.33	
Peterborough	20,989	291.66	
St. Thomas	15,924	225x	
Stratford	16,064	250	
Windsor	38,541	333.33	
P. E. ISLAND			
Charlottetown	12,329	125	
QUEBEC			
Valleyfield	9,180		15 d
SASKATCHEWAN			
Regina	34,432	275	

Promoting the Community Health

By Philip P. Jacobs, Ph. D.
Publicity Director, National Tuberculosis Association

IN 1905, when the National Tuberculosis Association first began its work, there were less than a dozen tuberculosis associations in this country, and most of these dozen were paper organizations. At the present time, besides the National Tuberculosis Association, there is a strong state association in every state and even in the outlying possessions of Porto Rico, Hawaii and the Philippine Islands; there is a strong local association in every large center of population, and there are other local associations in the less populous districts. These organizations number some 1,200 all told, and about one-half of them have either full-time or half-time executives.

The control of tuberculosis is distinctly a task for the city, the town and the county. State and even Federal aid may be necessary, but the ultimate control of the disease must be vested with the local authorities. The intimate connection between the tuberculosis campaign and any form of business men's organization is evident, particularly when one realizes that tuberculosis is the most serious health hazard that American industry has to face and is costing business more money than any other single disease.

The functions of a local tuberculosis association include:

1. *Demonstration.*—Bringing to the notice of communities all important new developments and turning over these developments to the community itself when the private agency has shown their worth.

2. *Education.*—Arousing community interest in the public health, or, as it has been so well put on other occasions, selling health to the individual and the community.

3. *Organization.*—Bringing together all of the agencies in the community in a combined movement against tuberculosis and for public health.

4. *Legislation.*—Securing necessary laws and ordinances for the control of the disease and the establishment of the proper official machinery to enforce the laws.

5. *Stimulation.*—The general supervision and standardization of all the activities, both official and non-official, with a view to seeing that every dollar spent for the public health produces one hundred cents' worth of value to those who contributed it, whether as taxpayers or in some other capacity.

The Provision of Institutional Facilities

Fifteen years ago there were less than 150 tuberculosis hospitals in the United States, with a total capacity of hardly 10,000 beds. To-day there are 600 such institutions with a total capacity of 60,000 beds. Fifteen years ago one could count the number of tuberculosis dispensaries on the fingers of one hand. There were no tuberculosis or public health nurses. There were no open-air schools. There were no preventoriums and, in fact, most of the community machinery for the control of tuberculosis that we now recognize as necessary was lacking. To-day there are 600 tuberculosis clinics and dispensaries scattered throughout the country, to say nothing of scores of traveling clinics that are bringing the doctor to the people instead of waiting for the people to go to the doctor. There are 10,000 public health nurses, of whom a very considerable number are doing tuberculosis work in whole or in part. There are several thousand open-air schools and fresh-air classes. There are scores of preventoriums for children.

The death rate from tuberculosis, which is the surest index of progress against the disease, is declining. When the National Tuberculosis Association was organized, in June, 1904, the death rate for tuberculosis for the registration area of the United States was 200.4 per 100,000 population. In 1919, the last available figures for the registration area, the rate was 125 per 100,000 and there is abundant evidence to show that for 1920 the death rate was down at least to 120. For 1921, figures from every available source indicate that the rate is still going down.

In spite of this encouragement, there is yet a big task before us. There are approximately 1,000,000 active cases of tuberculosis in this country, according to best available estimates. The chambers of commerce and business men's organizations can unite on no movement that will produce bigger results for themselves and for the community than this movement for the prevention of tuberculosis.

What the City Manager Plan Has Meant to Norfolk, Virginia

By William H. Jenkins

Information Secretary, Norfolk Chamber of Commerce—Board of Trade

AFTER a struggle extending over 182 years, in which the bi-cameral form of government managed to exhibit all of its undesirable features and practically no advantages, Norfolk, Va., inaugurated the city manager form of government September 1, 1918, with Charles E. Ashburner, former city manager of Springfield, Ohio, as city manager.

To say that the new form has made good is but to summarize the expressed view not only of the original supporters of the plan, but of practically all its former enemies.

"It has made good because it has proved the contentions of its investigators, that it would be a business form of government," you will be told by almost any voter you may approach on the subject.

"It has made good because it has given the city a credit whereby it has been enabled to sell its securities readily at the top figure for such paper," Norfolk will tell you.

And it has made good because it has given the people something for their money—because they have been able to see, by concrete improvements, that their money has been spent without regard to political preference or petty legislative manipulations. More than nine million dollars has been spent for public improvements in Norfolk since the new form was inaugurated.

Ward Lines Eliminated

The effect of the new charter is to eliminate the ward lines which governed the selection of councilmen under the old form of government. Five councilmen now are elected from the city at large, and are thus able to think in terms of the community rather than of some circumscribed ward. All administrative department heads are responsible to the city manager, who reports in turn to the council.

One accomplishment of the new government has been the complete separation of juvenile and domestic offenders from the police court and police station. The Juvenile and Domestic Relations Court is a separate institution, with its own judge, its own clerk, and other court officers. It has its own court building and a well-equipped detention home, far removed from the police station environment. All the city's legal affairs are handled by the Legal Department, in charge of the City Attorney and a full-time staff.

The Department of Public Works, in charge of a director who is an engineer of many years' experience, embraces the water department, highways and bridges, water construction and sewers, and public surveys. Under this department in the last three years forty-three streets have been paved, sewers laid on forty streets, and twenty-five miles of water-mains constructed. The 1922 program for street and sewer improvement provides for an expenditure of about one million dollars.

New $5,000,000 Water-Plant

In addition to these improvements, the

PANORAMA OF PIERS AND MUNICIPAL TERMINALS OPERATED BY THE NORFOLK PORT COMMISSION

city is now completing a five-million-dollar water-plant, which will give a supply ample to meet the city's needs for the next fifty years, and will permit of tapping an inexhaustible supply of water with a small additional cost. Under the old form of government, the city council investigated water-supplies and discussed the need of additional water facilities for fifty years. The new government decided what it was going to do and provided the means with which to do it in a few months.

The Department of Public Welfare, in charge of a director, includes a Board of Health with six physicians and nine trained inspectors. There is also a bacteriological laboratory where work is done for the city and surrounding territory. Inspection of dairies and meats comes under this department. Then there is a city hospital, built by the municipality and operated free for those unable to pay, as well as a city dispensary where prescriptions are filled for those who are not financially able to purchase drugs. Through the medical inspection of schools, a card index is kept of every child during his entire school life, with the idea of correcting defects.

Included in the Department of Public Welfare are the bureaus of markets, parks, city home, cemeteries, and standards (weights and measures). Twenty-three playgrounds fully equipped and in charge of paid supervisors are in operation.

A city planning commission has been created by the City Council, which has done conspicuous work in widening streets and developing new thoroughfares, and in paving the way for the annexation of about fifteen square miles of territory, which is now pending.

Port Development Undertaken

One of the most notable accomplishments of the new government has been its success with its port development plan. After considerable study of conditions at other ports, the City Council created the Norfolk Port Commission, composed of business men who serve without pay and are chosen with particular attention to their qualifications for handling the various phases of port development. This Commission is now successfully operating a large portion of the Army Base terminal facilities here as a municipal terminal under a lease arrangement with the War Department. The Commission has secured desirable pier and switching charge arrangements with the belt line and trunk line railroads, and is demonstrating the success of the municipally owned terminal idea.

The Port Commission is now building a huge grain elevator on a site fronting half a mile on Hampton Roads, owned by the city, the scheme including piers, warehouses and oil storage tanks. The management of all municipal terminal facilities is in charge of the Director of the Port, who reports to the Port Commission.

The Department of Public Safety, under a director, consists of the divisions of police and fire, electrical affairs, building and plumbing inspection, and the care of public buildings. Conspicuous among the accomplishments of this department has been the complete reorganization of the Police Department, placing it on a basis of highest efficiency rather than politics. From a department of 212 men lacking in training, discipline and morale, receiving $4.15 per day for the days they worked, the personnel has been raised to a force of 276 men, well trained, of high character, and working in harmony of promotion. The minimum pay scale is now $1,890 per year, straight time, with a working day of eight hours.

The personnel of the Fire Department has also been materially strengthened, a two-platoon system put into effect, considerable equipment added, and a thorough system of fire inspection installed.

Revenue System Overhauled and Savings Effected

Under the close supervision of the City Manager as acting Director of Finance, the revenue has been greatly increased through the offices of the Commissioner of the Revenue and the License Inspection Bureau, without an increase in the license rate. For instance, on the same item on which $280,706 was collected in 1917, nearly two million dollars is being collected to-day, by the elimination of favoritism and the education of the public in taxation matters. The offices of Auditor, City Treasurer and License Inspector are also part of this department.

Norfolk is willing to admit that its form of government may have flaws in it. But Norfolk will also tell you that no flaws of perceptible size have been found as yet.

And when they are found, if they are there, the process of rectification is simple in the extreme.

How Norfolk Feels About It

Some idea of how Norfolk people feel toward city manager government can be had from the following statements by prominent business men:

Barton Myers, chairman of the Norfolk Port Commission, says:

"The city manager form of government here has completely transformed conditions under which we previously operated. The old organization of a two-chamber legislature, with representatives in the councils from ten wards, resulted in the usual log-rolling, through which unnecessary expenditures were frequently made to secure votes from wards, where expenditures were not of equal importance with many matters left undone. The constantly changing personnel of an unpaid council brought in men of inexperience, sometimes only actuated by personal ambition or interest. We now have a legislative paid council of five business men with a very active and efficient city manager. The development of the city is treated as a whole, all propositions are considered and legislation promptly adopted. The result has been the adoption of a harmonious plan of physical improvement, a reorganization of the police, health and other departments. And while this simplified form of government has now been in operation about three years, its superior efficiency is so generally recognized that under no circumstances would we return to the former system."

Asked what he considered the greatest gain to the city from city management, City Manager Charles E. Ashburner said:

"The greatest things accomplished by the city manager form of government are the absolute elimination of politics from the city administration and substituting merit for political pull. The elimination of ward lines, thereby causing the people to think of the community as a whole, creates the heretofore unknown spirit of cooperation. A city gets only the kind of government the people deserve, and all credit for the things that are accomplished is due to the people, who by their support make it possible for public officials to render the service for which they are paid."

H. H. Rumble, of the firm of Rumble & Rumble, attorneys at law, says:

"What the new form of government has meant to Norfolk may be summarized in the statement that it has meant a thorough-going business administration of the affairs of the city. We have a well-organized and very efficient police force, cleaner streets, increased speed and efficiency in handling public business, and an extensive program of street and other public improvements now under way. I know of no thoughtful citizen who would be willing to return to the old order of things."

Henry G. Barbee, President of the Chamber of Commerce, says:

"City management here is a business management consisting of five business men with a general manager; which means in turn that the business of the city is handled around a table, as the directors and general manager of any business handle their business. City manager government has proven in the mind of every good business man that it is a great success. I do not believe that I am putting it too strongly when I state that we are getting 33⅓ per cent more results from actual money spent than ever before."

W. G. Swartz, of Miller, Rhoads & Swartz, says:

"Wonders have been worked in the systematic routine of affairs in the short time the city manager form of government has been inaugurated. Politics have been entirely eliminated from city affairs. Red tape has been abolished, as power and authority have been concentrated under one head. Perfect harmony rules, as the Manager and Council are working together as one."

Second Western Summer School of Community Leadership

Palo Alto, California, September 18-23

Arrangements have just been completed for the holding of the second Western Summer School of Community Leadership at Palo Alto, Calif., September 18-23. This year, Leland Stanford University, the League of California Municipalities, and the California Association of Commercial Secretaries have combined with the American City Bureau in the organization of the school. This is the first time that a state league of municipalities has adjusted the time and place of its annual convention to meet jointly for conference and study with chamber of commerce executives. The success of last year's school gives promise of a most interesting session this year. Information can be obtained from the San Francisco office of the American City Bureau, Merchants Exchange Building.

Garbage and Refuse Collection Motorized in Los Angeles

City Engineering Department Invests in Trucks as Conservation Measure

THE Engineering Department, Los Angeles, Calif., has estimated that a saving of approximately $25,000 per year over the cost of collection by the old private contract has been effected by the installation of 15 motor trucks of 2½ tons capacity for removing rubbish and garbage throughout the city. Previous to the installation of motor equipment by the city, this work involved an expenditure of $70,000 per year.

The bodies of the Model 70-H Garford truck, 8 of which are shown in the accompanying illustration, have a capacity of 10 cubic yards. They are arranged with hinged sides, which facilitate easy collection of the load. When the sides are dropped, approximately two-thirds of the load can be attained. The sides may be conveniently raised, after which the maximum capacity can be loaded. Steps are provided on each side of the body for the lifting and dumping of rubbish cans over the highest point with the least possible effort. Quick discharge of the load is effected by releasing the tail-gate hinged at the bottom and rear of the body.

Certain sections of the city are assigned to each truck where it collects rubbish and garbage at stated times. Boxes containing tin cans and non-combustible rubbish are set near the cans by property owners. The trucks are manned by a driver and by two helpers who pick up boxes from the curb and dump the rubbish into the truck as it passes along. In sections of the city where alleys run along the rear of the houses, it is compulsory for the property owners or occupants to place the boxes on shelves, which makes it unnecessary for the helpers to step down from the truck, thus saving considerable time in loading. When the trucks are fully loaded, they are driven to a privately owned central station, backed up to the dump and unloaded. Through an incline at the dump, tin cans and rubbish slide to an endless belt about 40 feet in length, where broken glass and bottles are segregated, after which the tin and other metal is elevated to a bin and pressed into a solid mass about 3 feet square. These squares are later melted and made into window weights.

The garbage trucks operate in much the same manner as the rubbish collectors. Open sheet iron bodies are provided. When fully loaded, the trucks are driven to flat cars with steel sides. The truck bodies, with the loads, are elevated from the chassis by means of a crane and dumped onto the flat cars. This operation consumes not more than five minutes. The loaded cars are then made up into "The Garbage Special" and taken to a ranch a few miles outside of the city.

This system of rubbish and garbage removal and disposal has considerably improved sanitary conditions in Los Angeles.

THE LOS ANGELES GARBAGE COLLECTION FLEET

Shall the States Lose Control of the Public Utilities?

By Sedley H. Phinney
Executive Secretary, New Jersey League of Municipalities

WITHIN the last few months there has been a development in public utility regulation that threatens to end state control of this field and make it a function of the Federal courts. It is one more example of the growing tendency toward government by injunction that many deplore as threatening the orderly processes of legislative procedure. A large number of city and state administrations have been aroused to the danger and are at close grips in Washington with financial and utility interests.

This struggle centers around the Bacharach Bill in the House of Representatives, H. H. 10212, the cities being for, and the utilities against, its passage. This bill was introduced at the request of the New Jersey Public Utility Board to correct a situation that had arisen in New Jersey. It would limit the jurisdiction now assumed by United States district and circuit judges and their power to set aside and nullify a judicial determination of a state public utility commission in any case where a right of appeal or review is given by the laws of the state.

The case out of which it grew involved the determination of street railway rates in a territory including two-thirds of the population of the state. It was pending for two years, and nearly 14,000 pages of testimony were taken. The Board, by a unanimous decision, fixed a rate. The state statute under which the Board is created gave to the utility the right of review by the Supreme Court and of appeal to the court of last resort, the Court of Errors and Appeals of the state. Of course, it also had the right of appeal from the latter court to the United States Supreme Court on constitutional questions. The utility in question ignored the courts of the state and made an ex parte application upon affidavits to a United States District Judge for an injunction restraining the Board from carrying out its order, although the order of the Board made no reduction in rates. On this ex parte application an injunction was granted. It was subsequently vacated, but again granted on a hearing on affidavits, after the District Judge had called in two other judges, as provided by Section 266 of the Federal Judicial Code, one of the other judges voting with the District Judge. The record in the case, upon which the Board made its decision, was not admitted in evidence. Thus the expenditure of $75,000 by the cities of the state in this case is made worthless, as the case must be started de novo before a Federal master. On this hearing of a summary character the utility corporation was authorized by the Court to fix a rate in excess of that allowed by the Utility Commission.

This was the first large-scale example of this procedure. It was recognized that the same thing might be done in other states if this became a precedent. If utility corporations engaged in purely intrastate business are permitted to override the State Utility Commission's judicial determination, to repudiate the orderly and adequate state procedure for review by the state courts of the State Commission's orders, and to obtain from a Federal district judge not only an injunction against the fixing of a rate by a utility commission, but an order authorizing a rate which the Federal judge thinks permissible, it will be but a question of time when not alone in the state of New Jersey, but in every state, the same practice will be followed by utility corporations. Thus, regulation by the state of its own utility corporations will have passed out of the hands of the state and into the hands of the Federal District Court. Utility corporations will then have accomplished, in this way, what they have long sought, namely, the destruction of state regulation.

A nation-wide campaign was begun for support for the bill. Governor Edwards wrote to the governor of each state, and the Utility Board wrote to each similar state commission, and the New Jersey State League of Municipalities wrote to a large

number of individual cities, municipal leagues, interested individuals and organizations. Several events combined to assist these campaigns. In April the New York Telephone Company obtained an injunction from a Federal judge setting aside an order reducing telephone rates issued by the State Public Service Commission. A week later another Federal judge granted to the Chicago surface lines an injunction preventing the Illinois Commerce Commission from reducing fares from eight cents to six cents. In St. Paul it appeared as though a similar injunction would rob the city of the benefit of its efforts to keep down utility rates.

Only a half-dozen were present at the March hearing on the Bacharach Bill before the House Judiciary Committee, but the April hearing was attended by more than fifty state and municipal representatives from all over the country, and the May meeting had equally strong support. Mayor Hylan, of New York, the Corporation Counsels of New York and Chicago, the Mayor of St. Paul, the Deputy Attorney General of New York State, the Attorney General of Ohio, and the General Solicitor of the National Association of Railway and Utilities Commissioners appeared in person. The governors of thirty-four states have written in support of the bill and also the utility commissions of eighteen or more states. The Municipal Leagues of Kansas, California, Virginia, Texas, and New Jersey, and the New York State Conference of Mayors have gone on record for this bill, and the Minnesota League will undoubtedly favor it at its June convention. A large number of individual cities have realized the importance of this issue and have taken action.

Opposed to this array of the representatives of the people is a strong, well-organized, but relatively silent, group of special interests. The Judiciary Committee displays reluctance to report the bill and seems inclined to delay matters by holding additional hearings until too late to pass the bill this session. The New York State Conference of Mayors unanimously endorsed this bill at its annual meeting at Poughkeepsie, June 7, just as the annual convention of the League of Texas Municipalities endorsed it a week or so earlier. Various newspapers have expressed the thought that this bill, a clear case of the corporations against the public, will become a political issue in certain quarters this fall. Meantime state regulation hangs in the balance and the outcome is doubtful.

A Telling Highway Warning

By Felix J. Koch

GOOD roads are perhaps the first and most actually important factor in bringing the motor-tourist and the commercial traveler by automobile into a city. But even the best of roads may contain their wayside pitfalls—bad bends, leading off into ditches and the like—which the trusting driver, the more trustful for the excellent road he finds himself upon, cannot suspect until too late. Against such things as these the publicity folk of the localities are mounting their signs at the waysides.

Just how these signs shall be phrased to convey their messages, and yet make it appear to the traveler that the city does want the motorist, that it welcomes and, in turn, wishes God speed to the stranger, becomes, very often, the subject of no small amount of planning and acumen. The picture is of one of the very latest and best efforts in this direction by the town of Addyston, Ohio.

A WARNING THAT FEW WILL IGNORE

A Memorial Wading Pool in Rock Island, Illinois

By Theodore J. Moreau

Langford & Moreau, Landscape Engineers, Chicago, Ill.

IN the memory of our city fathers, the wading pool of their "days of real sport" was nothing more than the muddy puddle found after a summer shower, or possibly a frog pond or a creek, and in some instances the deep and dangerous waters of a lake or a river. While a large number of cities and towns can boast of no better facilities of this character, steady progress can be observed in the development of modern concrete wading pools in many of our progressive cities. Thanks to the generosity and public spirit of one of Rock Island's citizens, the children in at least a portion of that community can enjoy something more sanitary than the puddle or the frog pond and safer than the treacherous waters of a lake or a river.

AN ATTRACTIVE MEMORIAL WADING POOL FOR CHILDREN

The Helen Horst Memorial, designed by Langford & Moreau, is located in the heart of the residential district in Longview Park on a site offering more than an ordinary opportunity for a treatment that combines utility with beauty and distinction. It consists of a wading pool with semicircular seats flanking a drinking fountain on one end, and a curved, sheltered, double seat, of a pergola type, on the other end, overlooking a semicircular sand box and the wading pool on one side, and on the opposite side commanding a view of the lower plateau of the park at the foot of the bluff, with the city in the foreground and the Mississippi River in the distance. The existing planting and arbor-vitae-studded walks bordering one side of the memorial are being replaced with a mass planting of evergreens. This will provide a proper background for the fountain end of the pool and a setting for the dressing station now being constructed.

The pool structure is of reinforced concrete throughout, with a mottled brick walk laid in a basket-weave pattern. The dimensions of the pool proper at the water-line are 80 by 30 feet with a maximum depth of 25 inches of water at the center. At the edges the water has a depth of 6 inches, the curb at the edges standing 6 inches above the water surface. The floor of the pool proper is laid on a bed of clean sand, with tile drains to keep the foundation dry. The floor slab is in one piece without joints except at the outer edges against the curb, where the joint is calked with an asphalt compound. Because of the shape of the sloping floor, the thickness of the slab varies from 6 to 10 inches and is reinforced accordingly.

The walk around the pool has a minimum

width of 7 feet, and is laid flush with the top of the pool curbing, with a slight pitch outward to drain away from the pool. The brick are laid smooth face up on a thin layer of sand spread over a base of 4 inches of reinforced concrete. Joints between bricks are grouted to form a surface which sheds water. The sand box also has a 4-inch floor of concrete provided with a drain at the lowest point.

The seats are of concrete, cast in sections and afterward erected on their foundations. The canopy supports, including posts, brackets, and girders, are of structural steel cast into concrete, the girders being bent to the proper radius to support the rafters of wood. The canopy is a light brown duck with a white trim.

The drinking fountain bowl, of cast concrete fitted with two constant-flow bubbles, is supported with a bracket projecting from a concrete panel trimmed with mottled brick and mounted with a bronze tablet bearing the following inscription:

HELEN HORST MEMORIAL
Dedicated to the
Children of Rock Island
By the Parents of Little Helen
Who Lost Her Life
In the Waters of Rock River

******

Isaiah 45:15 **1921** **Henry W. Horst**
Mollie Horst

A more appropriate memorial could hardly have been conceived, and the happiness that it brings to the children of the community it serves is its finest tribute. Many other cities might well be enriched by similar improvements if their public-spirited citizens could pause for a moment on a hot summer day and watch the little tots, in endless number, splash away to their hearts' content, as they satisfy in a safe way their irresistible longing for water.

TECHNICAL HIGH SCHOOL, SCRANTON, PA.

1505 boys and girls in two daily sessions and 1017 students in the evening classes make use of this school, which on a one-session plan would accommodate but 850

Developments in Methods of Constructing Brick Pavements

By Arthur H. Blanchard

Professor of Highway Engineering and Highway Transport, University of Michigan

THE time is opportune to analyze the present status of paving brick and brick pavements, especially from the standpoint of types of paving brick and also because that leader of practice for many communities, the National Paving Brick Manufacturers Association, recently has given material aid in the simplification of the paving brick situation and is now advocating the general utilization of an efficient method of construction. In this discussion of brick pavements, only two important characteristics of an ideal pavement will be considered. It is generally acknowledged that satisfactory pavements must be durable and water-proof. A brief analysis of the several types of brick pavements will be given from the standpoint of these two essential characteristics.

In the early days of brick pavement construction, a sand foundation and a sand filler were employed. This foundation proved inadequate for even medium traffic, and the joints, being filled with sand, allowed water to pass through them to the sand bed below. A movement of the sand in the joints and bed naturally followed, with the resulting displacement of the brick under traffic.

A Permanently Satisfactory Filler

The first noteworthy development was the utilization of the cement concrete foundation, sand cushion and bituminous cement with which to fill the joints. These improvements indicated the application of sound engineering principles to the design of brick pavements. It was soon recognized that one essential feature of this method of construction was to utilize a bituminous cement which would adhere to the brick and would not be susceptible to changes in temperature to such an extent as to make it unsuitable for use as a filler. Unfortunately, some of the bituminous cement fillers employed had a tendency to chip or become brittle in cold weather and to flow in warm weather. The results were unfortunate, as the joints did not remain filled with bituminous cement and the exposed edges of the brick were chipped or broken off by the impact of iron-tired wheels or horses' hoofs. Fortunately, however, many brick pavements were laid with joints filled with asphalt cement having the proper physical and chemical properties, including a minimum susceptibility to changes in temperature.

In 1911 and 1912 the writer had the opportunity to inspect many sections of brick pavement with asphalt-filled joints, in municipalities in Indiana, Michigan, and Wisconsin. These pavements had joints filled practically flush with the surface of the pavement, although they had been subjected to traffic for from five to ten years. The pavements possessed the desirable durability, and the surfaces were waterproof. This type of construction has continued to be used by engineers who are familiar with the best methods of constructing pavements.

The next development was fathered by the National Paving Brick Manufacturers Association. It consisted in the substitution of cement grout filler for the bituminous cement filler. After several years' use of this method of construction, it was finally conceded that it was very difficult to secure uniformly filled joints by using cement grout and that a monolithic brick slab cracked, on account of temperature stresses, thus enabling water from the surface of the pavement to reach the sand cushion, which gradually became displaced. It also became evident that the action of traffic on the weak sections of the pavement surface and on portions of the brick wearing course over the areas of displaced sand cushion caused many failures of brick pavements. These failures were due primarily to contraction stresses. Failures, however, occurred, due to expansion stresses, such as

the "blowing up" of sections of brick pavements.

The next developments were also introduced by the National Paving Brick Manufacturers Association, one of the new methods consisting in laying the brick on a cement mortar bed resting on a cement concrete foundation, and the other, in laying the brick on green concrete. In both methods the joints were filled with cement grout. These methods are not at present promoted by the Association.

West of the Mississippi, the Western Paving Brick Manufacturers Association has exerted considerable influence. This Association advocates the use of what is called vertical fiber brick with the rough surfaces uppermost, and recommends that the surface be covered with a squeegeed coat of asphalt and the joints filled with asphalt cement.

At a meeting of the National Paving Brick Manufacturers Association, held on December 7, 1921, the Association expressed "its confidence in asphalt-filled brick wearing surface for street and highway paving, properly designed and built with acceptable materials and thorough methods," and further declared "its preference for the asphalt-filled types of wearing surface," with the proviso that "preferment of the foregoing type of brick wearing surface for general use shall be without prejudice to any other type which may possess peculiar adaptation to special local conditions." In view of the fact that the Association has exerted a powerful influence over the practice of the construction of brick pavements in many sections of the country, it is hoped that, as a result of its latest recommendation, the durability of future construction in all sections of the country will not be jeopardized by the use of cement grout as a filler, but that bituminous cements possessing the desired characteristics will be universally employed.

In order to insure the use of a bituminous cement possessing the desirable practical minimum susceptibility to changes in temperature, the writer, in his private practice in northern states, has recommended, among other requirements, the following clauses covering the penetration of asphalt cement fillers:

Penetration at 25° C. (77° F.), 100 grams, 5 seconds, 30 to 40

Penetration at 4° C. (39° F.), 200 grams, 1 minute, not less than 15

Penetration at 46° C. (115° F.), 50 grams, 5 seconds, not more than 85

In order that the asphalt cement may be economically used to fill the joints, the writer advocates the use of conical pouring cans. The practice of squeegeeing asphalt cement over the surface of a new lug brick pavement is uneconomical, as a thin surface of asphalt cement is not an essential part of a properly constructed brick pavement. Whereas it may be practicable to secure good adhesion between asphalt cement and the rough surface of the wire-cut sides of paving brick, the experience of the writer indicates that asphalt cement applied to the glazed surface of paving brick will usually peel off after being subjected to intensive and heavy traffic.

The present types of paving brick manufactured require careful consideration from the standpoint of the efficient construction of durable and water-proof brick pavements.

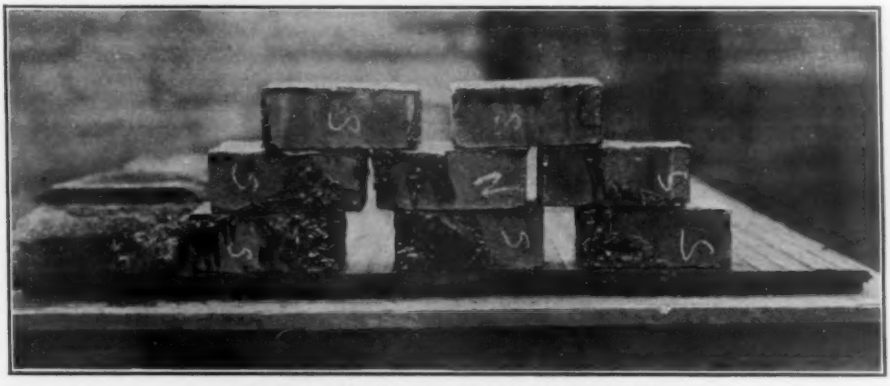
Elimination of Varieties

A notable economic development resulted from the action of the Secretary of Commerce of the United States, Hon. Herbert C. Hoover, in calling a Conference on the "Simplification of Variety and Standards for Vitrified Paving Brick" in Washington on November 15, 1921. This Conference recommended the elimination of fifty-five out of sixty-six varieties of paving brick used in the United States. The eleven varieties which were retained include two sizes of plain wire-cut brick, two varieties of repressed lug brick, two varieties of vertical fiber lug brick, three varieties of wire-cut lug brick, and two varieties of Hillside lug brick.

Leaving out of consideration Hillside lug brick, highway departments east of the Mississippi River are primarily interested in the three types—plain wire-cut brick, repressed lug brick, and wire-cut lug brick. The two types of lug brick have been in successful use for many years and their inherent merits are well established. Many highway departments allow the use of either of these types under their specifications. It is well known that the utilization of lugs on the sides of these two types of brick is for the purpose of uniform spacing in the laying of the brick in pavements and

for the providing of joints which can be filled satisfactorily.

In 1919, some of the manufacturers of vitrified paving brick began to manufacture a plain wire-cut brick. As a result of the United States Department of Commerce Conference, two sizes of this type of brick will be manufactured, namely, 3 by 4 by 8½ inches, and 3½ by 4 by 8½ inches. As these brick do not have lugs, it is apparent that two requirements relative to depth may be satisfied with one size of brick. For example, the 3 by 4 by 8½-inch brick may be used by highway departments which wish to lay brick with a 4-inch depth, and also by those departments which wish to use a 3-inch depth.



BRICK REMOVED FROM THE TEST PAVEMENT

Since the introduction of this type of brick, the writer has endeavored to determine its merits and the economy of its use. It is apparent that the following question would naturally arise: Will it be practicable to space the brick during construction so as to provide uniform and satisfactory joints? It was soon evident that the proper construction of a pavement surface of lugless brick would depend upon the ability of the pavers to satisfactorily and uniformly space the brick. Reports from contractors indicated that considerable difficulty was encountered, even leading to the use of artificial means, such as the employment of an angle-iron, to secure the desired joints in the brick surface.

Information relative to the results secured was so unsatisfactory that the writer decided to construct an experimental pavement in the laboratories of the Division of Highway Engineering and Highway Transport at the University of Michigan. He wishes to acknowledge his indebtedness to Professor John H. Bateman, Director, Michigan State Highway Laboratory, laboratory assistants and two engineers of the Ohio Paving Brick Manufacturers Association for their kind cooperation in the construction of the test pavement.

A Test Pavement

The experimental pavement was constructed within a wooden frame, 2 feet 6 inches in width and 8 feet in length, which rested on a cement concrete floor. A sand bed, 1 inch in thickness, was prepared, upon which 3½ by 4 by 8¼-inch plain wire-cut brick, furnished by the Metropolitan Paving Brick Company, were laid by one of the engineers of the Ohio Paving Brick Manufacturers Association. The section was laid to conform with average practice on contract work. A Texaco asphalt cement filler, having a normal penetration of 33, was heated to 350° F. It was poured by one engineer and squeegeed by another engineer of the Ohio Paving Brick Manufacturers Association, in accordance with the standard specifications recommended by the National Paving Brick Manufacturers Association.

On several rows of brick, complete measurements covering the widths of all end and side joints were taken before the application of the filler. The measurements, expressed in inches, of the end joints of a part of a typical row follow: 1/16, 1/64, ⅛, ¼, ⅛, 1/16, 1/64, 1/16, 1/64. The joints on

one side of this row measured as follows, there being two measurements to each brick because the bricks were laid to break joints in adjacent rows: ⅛, ¼, 1/16, 1/16, ¼, 3/16, ⅛, ⅛, 1/16, ⅛, 5/16, 3/16, ⅛, 1/32. The measurements on the other side of this row of brick were as follows: ⅛, 1/32, 1/16, ⅛, 1/64, 1/64, 1/64, ⅛, 3/16, 3/16, ¼, 3/16.

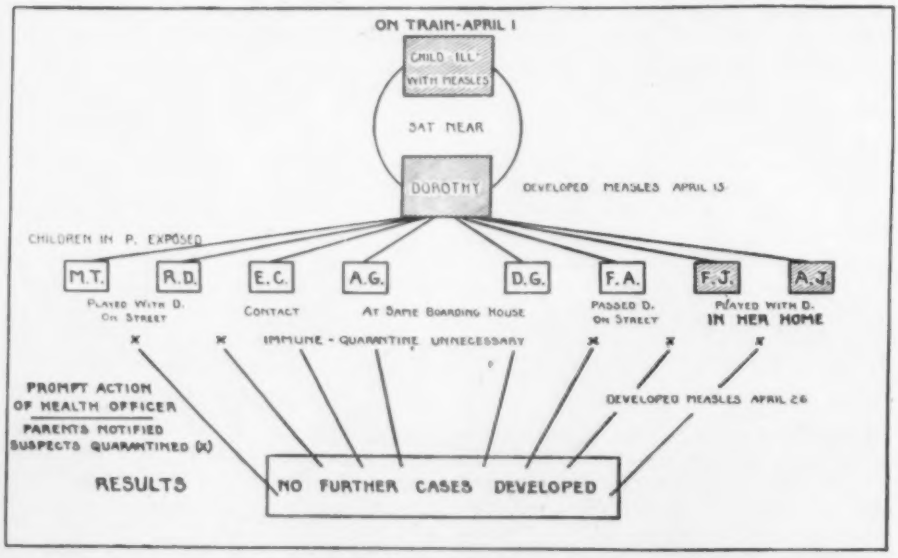
With the approval of the engineers representing the Ohio Paving Brick Manufacturers Association, the pavement was taken apart four days after it was laid. The depth of penetration of the asphalt cement on the sides of the brick was found to vary from 0.1 to 3.5 inches, the full depth of brick. The average depths of penetration on three sets of six consecutive bricks were 0.7, 1.2 and 1.6 inches. The illustration shows the penetration of the asphalt cement on the sides of eight typical brick taken from the test pavement.

The results obtained in the construction of the test pavement conform with the results which one might expect from the use of plain brick without some artificial means of securing suitable open joints. Even if some method, such as the use of an angle-iron, was employed to secure uniformly spaced plain wire-cut brick, there is no guarantee that the brick would not be displaced during rolling prior to the application of the asphalt filler.

Considering the established fact that successful asphalt-filled brick pavements may be constructed with repressed and wire-cut lug brick and that the use of plain wire-cut brick is accompanied with great risk relative to securing well-filled joints, the writer is of the opinion that conservative practice dictates that only lug brick should be employed. From the standpoint of the economics of construction, the use of the plain wire-cut brick is not justified. There is no indication at present that there is any material difference in the price per thousand of the lugless brick and the lug brick. Furthermore, granted an increase in cost of lug brick over lugless brick, the excess cost of lug brick is a good investment from the standpoint of insuring the construction of a durable pavement with the joints properly filled with asphalt cement.

Acknowledgment.—From a paper read before the Eighth Conference on Highway Engineering at the University of Michigan.

Why Quarantine Should Be Enforced in Cases of Measles



IN THIS DIAGRAM THE NEW YORK STATE DEPARTMENT OF HEALTH EFFECTIVELY SHOWS THE VALUE OF QUARANTINE

Forward Steps in Municipal Affairs

WELL-DEFINED PARKING LINES PREVENT TRAFFIC MIX-UPS IN STURGIS, MICH.

City Managers

Solving the Parking Problem in a Small City

STURGIS, MICH.—Usually the parking question is associated with the larger cities, where the dense traffic, street cars, motor busses and other conditions interfere with normal parking. The small city which supplies a large agricultural community has the same problem to contend with, however, on a smaller scale, of course, when a large number of cars are in town over the week-end and in the evenings.

In Sturgis we have reached a satisfactory solution by marking the streets as indicated in the photograph above. This marking increases the parking space by preventing irregular parking and still assures each machine room enough for persons to enter and leave the car.

The safety zone in the middle of the street is used by bicycles and pedestrians when they are crossing the street. Traffic is required to remain within the two main driveways, and pedestrians are required to use the walks outlined in the street intersections, together with smaller walks in the middle of each block.

This parking plan has worked out very satisfactorily in this city (with a population of 7,500) and the cost is only about $20 per year for re-marking.

R. D. BALLEW,
City Manager.

Police Departments

Detroit Has Fine New Police Headquarters

DETROIT, MICH.—On September 1, 1921, ground was broken for the new Detroit Police Headquarters and First Precinct Station. It is claimed that when finished, this building will be far in advance of any other police headquarters in the United States. It will embody features which are the result of many conferences held in other cities.

One radical departure from old methods will be the placing of all cell blocks on the upper two floors of the building (above the railing shown in the picture), where every prisoner will have perfect sanitation with abundance of light and air and yet be removed from public view. This will be a great improvement over the present method of placing cell blocks in the lower part of the building where, to have the prisoners removed from the public, they must be placed where light, air and proper sanitation are difficult to obtain. There will be about two hundred cells and detention rooms in all, so that prisoners may be divided into classes and the first offender will not be made to rub elbows with the hardened criminal. The cells for female prisoners will occupy part of the eighth floor, directly over the Women's Division, and will be entirely in charge of women and distinct from the cell blocks for males on the ninth floor.

The building, which will cost $1,665,000, was designed by Albert Kahn, architect, Detroit. Adjoining the main building will be an armory or drill hall, capable of holding a large body of drilling men, or five thousand people in meetings. This building will also be fitted out with gymnasium equipment, including a suspended running-track having ten laps to the mile. Under the armory proper, and on the street level, will be a daytime garage or parking space for all department vehicles. Patrol wagons containing prisoners enter this parking space by one of four entrances and pass through and enter a covered courtyard between the wings of the main building, going through a heavy iron gate, electrically controlled. This courtyard is virtually a large detention room, having only heavily barred windows on all sides, the only exit being the registration room of the First Precinct Station, and thence to prisoners' elevators, the Detective Department, and cell blocks. This feature will be valuable in periods of great excitement, as wagon-loads of prisoners being brought in will not be unloaded until they are actually inside cell walls.

Another feature will be a police school, which, in addition to the usual course given probationary officers, will have a course of lectures each winter for every rank in the Department. Judges of the Recorder's Court, leading attorneys and superior officers of the Department will be the lecturers. There will be courses on such subjects as the collection, preparation and presentation of evidence, and each course will terminate with an examination which will play a part in making up the record of the officer for promotion. The building will be ready November 1, 1922.

JOHN G. KNIGHT,
Secretary to the Commissioner.

ARCHITECT'S DRAWING OF DETROIT'S NEW POLICE HEADQUARTERS, NOW NEARING COMPLETION

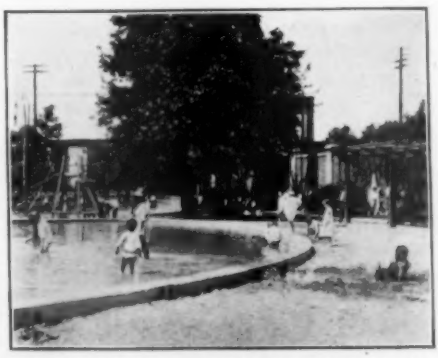
Recreation Departments

Philadelphia's Recreation Centers

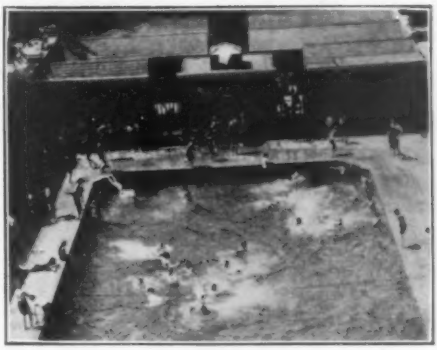
PHILADELPHIA, PA.—To provide every boy and girl, man and woman, in Philadelphia with facilities so that they may enjoy the pleasures and benefits of a regular swim in a clean and attractive pool of water, is one of the ambitions of the Bureau of Recreation.

There are 32 pools in the city under the direction of the Bureau, 22 being in buildings and known as baths. The other 10 are outdoor pools which are run in connection with the city's recreation centers. An appropriation of $300,000 is now available for the construction of outdoor pools, and it is hoped that five new pools will be built soon to replace some of the baths which are inadequate for the needs of the community. The present baths have reinforced concrete pools and shower and locker facilities, but are entirely too small to accommodate the eager throngs that daily seek admission.

Fine outdoor pools are run in connection with ten of the recreation centers of the city. These pools are of reinforced concrete, 36 by 90 feet in plan, and from 3 to 9 feet in depth. They are equipped with locker and shower facilities, adequate for the crowds they accommodate. The construction is all of a substantial nature. The buildings and walls around the pool are of brick, and the floors and pavements are of concrete. The typical pool is equipped with



WADING POOL IN ONE OF PHILADELPHIA'S PLAYGROUNDS



FORGETTING THE HEAT IN PHILADELPHIA

a large waiting-room to take the waiting children off the street and also to limit the number admitted at one time. Some of the pools have a large pavilion instead of a waiting-room. The waiting-room or pavilion opens into a locker-yard, where an individual locker is provided for each person. This yard is surrounded by a high wall, is equipped with toilet facilities, and paved with concrete.

In passing from the locker-yard to the pool, everyone must go through the shower-room, where six or eight ample streams of water thoroughly cleanse the bather. A turnstile exit allows the bathers to return to the locker-yards without passing through the showers.

All pools are open six days a week from nine A. M. to nine P. M. Certain days and hours are allotted for the various classes of swimmers. For instance, at many centers girls are allowed the run of the pool on Mondays, Wednesdays, and Fridays, except certain hours of the afternoon, and boys on the alternate days. In some sections the Monday morning class of girls is so small that the forenoon is given over to the boys. All pools have a daily swim from five to six P. M. for working men, boys being excluded between those hours. Some of the centers also give the noon hour to men. In many localities an early evening class for married women is well attended. An effort is made to adapt the schedule of the pool to the special needs of the neighborhood which it serves.

Under usual conditions the bathers are admitted in lines of 100 individuals each hour on the hour. Street clothes are stored

and swimming suits put on in the locker-yard. The individual locker-key is suspended on a tape from the neck of the bather. In passing from the locker-yard to the pool the bathers walk in double file through the shower-room, where adequate streams of water thoroughly wash the suit and body. In order that the progress of the bathers (small boys in particular) through the showers may not be too rapid, the teacher in charge stations himself at the shower-room exit to supervise the thoroughness of the ablutions. The bathers are allowed the run of the pool and diving-board until five minutes before the hour, when all must be in the locker-yard, dressing. Just before the hour is up, the line is out of the yard and all is ready for the incoming line on the hour. At some of the centers in congested districts, as many as 2,500 people are allowed the privileges of the pool in one day. It is necessary at these centers to shorten the time allowance on each "swim" on hot days so that the maximum number of people may be taken care of. During the hot weather early last summer, the attendance at the 32 city pools averaged from 275,000 to 325,000 individuals per week.

In addition to police supervision, there is at all times a staff of teachers on duty at the pools. These teachers supervise the handling of the lines of bathers and direct the conduct of the bathers in the pool. During certain hours of the day they give instruction to classes in swimming, diving and life-saving.

A very important consideration in all pools where large numbers of bathers are accommodated, is the maintenance of the water in a sanitary condition. Here the Bureau of Recreation feels that Philadelphia should be placed at the head of the list, for the precautionary measures are second to none in the country. Three times a day, once during the morning, the afternoon and the evening, between the swims, a bag containing a special chemical compound is drawn through the water. The principal ingredient of this chemical is calcium chloride. This treatment keeps the water pure during the day. At nine o'clock, when he comes on duty, the night man opens the discharge valves, and allows the pool to empty. By midnight he has finished cleaning the lockers and pavements, and the pool is empty. He then enters the pool, cleans its walls and floor with a disinfecting solution and a large broom, washing it all down with a heavy stream of water from a hose. After the washing is completed, the outlets are closed and the water turned on. The night man then goes off duty, the day force turning off the water when the pool is filled.

Among the noticeable features of the Philadelphia pools are the orderly way in which the crowds are handled, the clearness of the water, and the spick and span condition of everything about the pool. The choice of concrete for the structure and surface for both the paving and the pool was a happy one. The surface of the pavement has a wood floated finish, and is not slippery under the bathers' feet. The walls and floor of the pool have a hard surface, which can be kept clean with a minimum of effort, and which insures the constant maintenance of a clean, sanitary condition and maximum protection against the spread of contagious diseases.

Some of the centers are also equipped with concrete wading pools for the little tots, which are very popular. The one illustrated is located at the Waterview Center in Germantown.

S. L. ROSE,
Chief, Bureau of Recreation.

Well-rounded Recreation Activities

Winston-Salem, N. C.—Nestled in the foothills of the Blue Ridge Mountains of North Carolina is a fast-growing city which is already widely known in the industrial world, especially for its manufacture of tobacco. It is now making rapid strides in the recreational field, and its progress during the past three years has been remarkable. The climate is almost ideal and the playground and community work continue on through the winter.

There are now eight playgrounds and three athletic fields under supervision. The playgrounds are equipped with modern apparatus and have basket-ball, volley-ball, and tennis courts. The athletic fields are spacious, having baseball diamonds and tennis courts. There are also two beautiful parks with fragrant flowers, shrubbery, and seats among the shade trees. Only one swimming pool is maintained for the public at present, but preparations are now being made to place one in every section of the city.

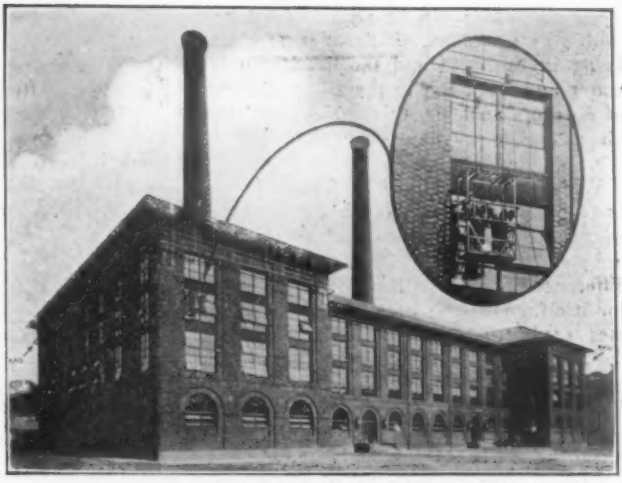
The recreational activities have been extensive and varied. Three baseball leagues, representing twenty teams, exclusive of the ones run by the Y.M.C.A. and industrial plants, are run each season. A six-team basket-ball league is he'd during the winter months, and this number will be greatly increased when more room is available. Two tennis tournaments are held annually. Lawn fêtes are held each year in connection with the physical education work of the public schools. Hike clubs are organized on the playgrounds, and the supervisors take the children for short hikes and a camp fire lunch on Saturday afternoons during the fall and winter months. An annual outing for the clubs of all the playgrounds is held and a whole day of organized games, chases, Boy Scout work, story-telling, and a camp fire roast. These activities are handled directly by the Parks and Playground Department of the city.

A beautiful and suitable spot on the banks of the Yadkin River is leased for three months by the Rotary Club of Winston-Salem. This site is used as a camp for the girls, the Y.M.C.A., and the Boy Scouts. Those who are unable to pay their expenses are sent there free and enjoy the same privileges as the rest. Huts and tents are furnished and the place is fitted up in true camp style.

Recreational work among the industrial plants of the city is conducted by the Y.M.C.A. through the generous cooperation of the institutions. Athletic games are played on the grounds during lunch hour and league meetings are held in the gymnasium of the "Y." All kinds of contests and socials are promoted, and a spirit of true democracy reigns. Several industrial plants of the city have recreational departments of their own.

Winston-Salem has also abolished all places which tend to corrupt and dissipate.

W. E. VAUGHAN-LLOYD,
Director, Parks and Playgrounds.



CLEVELAND WATER-WORKS, SHOWING WINDOW-WASHING EQUIPMENT, WITH INSERT OF CAGE

Water Departments

Window-Washing a Science Up-to-Date

CLEVELAND, OHIO.—The amount of money spent annually for the washing of windows is stupendous. Frequently on large buildings it is necessary to erect staging or other temporary means that involves labor and consumes time. Realizing this, the water-works engineers of Cleveland set about to find a better way to clean the windows of the new city water-works.

Their first idea was to erect an ordinary monorail with a specially constructed cage. The city went so far as to obtain bids on this, but the price proved prohibitive and the construction was so heavy and clumsy that the idea was abandoned. The water-works engineers, with the help of the Cleveland Crane and Engineering Company, of Wickliffe, Ohio, devised the installation shown in the accompanying illustration. The cage is equipped with two small winches by the use of which it is easily hoisted or lowered to any desired position. The absence of heavy supports, bracings and rods renders the construction very inconspicuous.

In this building there are about 4,600

windows, which can be cleaned by 3 men with this equipment in 12 days, two men being in the cage and the third bringing water and attending to them. At the rate of 60 cents an hour, this work would cost about $14.40 per day, or $172.80 for the job.

Without the use of the Tramrail, the best bid possible for a job of this kind where the scaffolding method would have to be employed is approximately $800. The difference is such that the system soon pays for itself. When it is once installed other uses readily suggest themselves, such as the painting of buildings, spouting, etc.

There are other advantages derived from the use of this new method of washing windows, chief among which should be mentioned the entire elimination of the element of danger from the task. With the Cleveland Tramrail, no life-belt is necessary This rail and its fixtures are of simple design and thoroughly standardized. Curves are no obstacle and neither are switches, for the rail can make as many turns as desired and actually turn in a 4-foot radius. The switches can be placed as close as every 3½ feet in any direction.

Another important feature is its ability to connect one department or building with another that is on a higher level, up to and including a grade of 12½ per cent. For transferring to higher levels than this or to a floor above or below, the Tramrail may be installed on any freight elevator and elevated. Consequently, it can pick up its load and put it down anywhere from the basement to the roof with but one handling.

W. J. WHITEHEAD,
Senior Assistant Engineer, Cleveland Water-Works.

Health Departments

Dayton's Child Welfare Campaign

Dayton, Ohio.—The Division of Health and Visiting Nurses' Association of Dayton conducted its fifth annual Child Welfare Campaign May 8 to 19; 1,427 babies were examined during this time.

This campaign has become an important local health feature, and many unofficial organizations cooperate to advertise it. While several cash prizes are still given,

SCORING BABIES IN DAYTON

the campaign has grown entirely away from the usual "baby show" affair. Realizing that the babies are given a thorough examination, most of the mothers come prepared to ask many questions. The babies are examined on 125 points, and a rating is made of each child based upon a score card embodying many of the features of the one published by the American Medical Association.

One of the noteworthy features of this campaign is the choosing of the prize winners. This is done without the babies being present. The babies are divided into eight age groups, and the prize winners are chosen from among those scoring highest. That the examination is thorough is shown by the fact that after the 24 prize winners are chosen and a few days later are gathered together for the distribution of prizes, every one, mentally and physically, "looks like a prize winner."

The net result of this yearly campaign is the stimulation of unusual interest in infant care. The members of the cooperating organizations have an object lesson in the possibilities of preserving infant life, and the mothers themselves are shown that most of the ills of babyhood are preventable by proper care. These mothers are taught the value of regular examination of the babies by the family physician.

We consider that this general stimulation of interest in babies, rather than the discovery of a certain number of defects, is the most important feature.

A. O. PETERS, M. D.,
Commissioner of Health.

Essentials of Modern Street Lighting

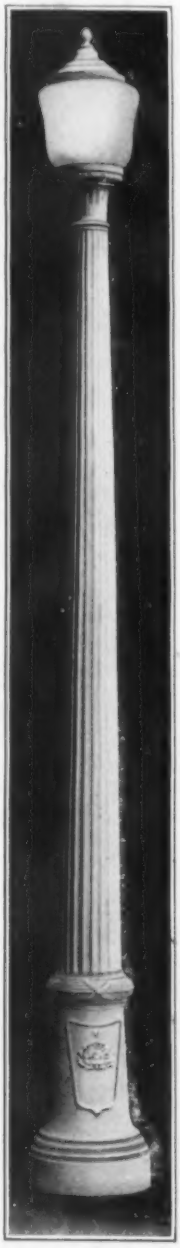
History of Street Illumination and Its Basic Principles

THE earliest street lighting was adopted as a means of protection against persons criminally inclined. Then the byways were lighted by means of lamps placed along the walks. From this stage street lighting became a means of safeguarding traffic against collision and of revealing obstructions in the roadway. In recent years street lighting has been developed into what some consider ornamentation, the idea being to beautify important thoroughfares and to promote business by attractive artistic effects.

Street lighting is comparatively modern, as the following data indicate:

1558—Paris, the first modern city to attempt civic street lighting; inhabitants ordered to place lighted candle lanterns in front of houses.
1766—Pitch or resin bowls substituted for candle lanterns.
1809—First street lighting by illuminating gas in London.
1821—Illuminating gas used in Baltimore for street lighting.
1884—Arc lamps used in Philadelphia for street lighting.
1896—Gas mantle lamps used first in this country for street lighting.

The modern history of street lighting began with the invention of illuminating gas and assumed its second interesting phase with the development of the direct current series carbon lamp. To-day it is recognized that an adequate system of street lighting in a modern city is required to promote safety from attack and burglary, to prevent stumbling and collision, to enable one to recognize the passer-by, to create a sense of security, and to eliminate eye fatigue caused by continual passing from dark to light and vice versa.



What Is an Adequate Lighting System?

Primarily, a street lighting system, as the term implies, should be employed to light the street, or better still, to illuminate the roadways, streets, alleys and sidewalks so as to provide the desired protection mentioned above. Light can be considered as the cause, illumination as the effect. The mere placing of a light at any point will not produce the desired result—illumination.

The three cardinal basic principles to observe in street lighting are: 1, efficient generation of light; 2, efficient utilization of light; and 3, keeping the eye in an efficient condition for observation.

The efficient generation of light has been an accomplished fact for many years. Notable examples of the means employed are the Welsbach mantle, the magnetic electric arc, and the gas-filled tungsten lamp.

For the efficient utilization of light, it is clear that the light rays which primarily spread in all directions spherically must be gathered up and redirected to the street surface and not allowed to escape upward. Proof that the light rays of many present street lighting equipments are wasted skyward can be had on any foggy night, when the amount of light sent to the skies is evident. Proof that light rays can be directed like water from a hose is seen in the automobile headlight.

To keep the eye in an efficient condition to perform its function of seeing, there must be minimum "glare." "Glare" can be defined as a blinding effect upon the visual apparatus caused by light shining directly into the eye. Glare also causes a distinct feel-

ing of discomfort, but lessening of ability to see in the presence of glare is of greater importance in this problem than discomfort. The blinding effect of glare is well known to anyone who has attempted to see when the light rays from an automobile headlight were shining into his eyes. Improperly designed street lights have a blinding effect similar to that of automobile headlights, and no system of street lighting that does not minimize this glare effect can be considered as adequate.

A further important item in keeping the eye in an efficient condition for observation is the matter of uniform illumination on the street surface. The eye is so constructed as to adjust itself to changing intensity of light. The light from the sun at noonday is 30 to 50 times as great as at dawn or dusk. We can see properly despite these changing intensities, providing the sun is high enough so that no glare blinds us. The intensity of full moonlight is only a small fraction of the intensity of sunlight or even of the average intensity used in interior lighting, yet it is possible to see perfectly in the moonlight because of the uniform illumination without glare or blinding effect.

PENDENT TYPE OF LUMINOUS ARC LAMP AT END OF BRIDGE, STAMFORD, CONN.

All streets should be equipped with units providing fair uniformity and freedom from glare, and the illumination should be varied to suit the traffic and business conditions. Streets located in the permanent business district should naturally have a higher intensity than those of a transitory business or a residence character. There should be a gradation of intensity depending upon the traffic and other prevailing conditions.

It is recognized that the efficiency of illumination of any system is of primary importance and must not be sacrificed to other considerations. Nevertheless, the esthetic importance must not be neglected nor overlooked. The problem of street lighting is one of the elements of city planning, and must be studied in relation to the future growth and development of the municipality. Proper emphasis should be given to the appearance of buildings and thoroughfares, and the lighting standards should be ornamental though simple in design. Utility and maximum efficiency should be coupled with esthetic principles.

Acknowledgment.—Prepared from a report of the Committee on Municipal Affairs of the Minneapolis Civic and Commerce Association, entitled "Basic Principles of Street Illumination for Use in Minneapolis."

Average Costs of Road Construction

THE Bureau of Public Roads has reported that 11,017 miles of Federal Aid road have been built since 1916. The table below gives the mileage of each type and the average cost per mile. The figures should be of interest as they are based on a large volume of work and are the most recent and reliable giving average results for the whole United States. The figures cover the entire cost of construction, excluding large bridges, and in a few cases the cost of engineering is not included in the table:

Type	Cost per Mile	Miles Constructed
Graded and drained.....	$9,200	1752
Sand-clay	6,850	1338
Gravel	9,230	4309
Water-bound macadam....	14,000	294
Bituminous macadam.....	25,720	382
Bituminous concrete.....	43,500	511
Concrete	36,600	2104
Brick	46,875	224

These figures are based on the entire period of operation of Federal Aid, but the major portion of the work has been done since 1918. During the period since 1917 there has been a general tendency to construct more substantial roads to meet the needs of modern traffic.

Tree Planting on Highways

By A. R. Hirst
State Highway Engineer, Madison, Wis.

MOST places which are intending to capitalize and encourage tourist traffic should pay a very considerable amount of attention to having their roads run, if possible, where the scenery is attractive or where lakes, rivers, mountains or forests can be seen well and be made accessible. If these features are not present, there should be the strictest adherence to utilitarian practice in selecting the shortest roads which will carry traffic safely and cheaply.

Preserve the Trees

Every tree which adds any beauty to the landscape should be saved, if possible, and where there are groups of trees offering effective relief, it is worth while to make changes of the center line to save these trees, even if additional right of way has to be secured on the other side. A good tree takes many years to grow and can be cut down in a few minutes. Most of us have been wasteful in our destruction of good trees and have not made the exceptions which should have been made in saving trees or groups of trees of distinctive character and merit.

Within the limits of slopes, brush and shrubbery, as well as all other vegetation, have to go. In many cases, however, the clearing and grubbing limits are defined as wider than the slope limits, and thousands of acres of effective shrubbery and flowers have been destroyed which could just as well have been saved. The clearing and grubbing limits should follow the slope line except in the Northern States where snow-drifting can be expected. In such cases low-growing brush cannot be encouraged, because it promotes snow-drifting unless the line of brush is well back from the edge of the cuts.

Probably not enough attention has been paid to buying additional right of way where snow-drifts occur and to planting shrubbery far enough back in the fields so that the snow will not be thrown upon the road cuts. This is probably the most effective method of keeping the roads open and should be used more generally. The choice between shrubbery and snow-fences as means of locating snow-drifts is probably close.

Trees Need Care

A great deal has been said about tree planting along the highways. It is to be encouraged if it is carried out and followed by an organization which has some permanency, but the spasmodic trumpet-blowing attempts to plant a few ineffective saplings on certain days and then think about them no more, have rather discouraged most highway engineers, who really believe in tree planting where the surrounding conditions permit. There have so far been more "nuts" bearing trees to plant, than planted trees bearing nuts.

A great deal of this work has been done without forethought and judgment. If anything really effective is to be done, it must be done by a state or county highway department in cooperation with the state forestry department, and not only must the trees be planted, but they must be carefully tended until they become old enough to take care of themselves. There will undoubtedly be advances in this direction in the next few years. With good care and judgment exercised in the selection and planting of trees of suitable character, there is nothing objectionable about planting trees along the highways, and there is much to be said in favor of it. Even if in some cases a bonus has to be paid to abutting farmers on account of losses due to shading, it is worth while from the public standpoint, and it is possible to secure such relinquishments from abutting farmers, when advisable, at a very reasonable cost, considering the artistic effects and real benefits to be secured. Even in well-timbered states there are sections where a little green on the landscape and a little shade are very welcome indeed.

These general remarks as to trees apply also to shrubbery. Planted with discretion, flowers and shrubbery of the right kind certainly add very much to the general road-

side appearance and are worth money if the beautiful is ever worth money. All these matters, however, will have to be developed slowly, as a very small fraction of our people are willing to spend any considerable amount of money in highway adornment. In the opinion of most people, the highways are too badly needed to permit the spending of large sums in beautifying them. A good many feel that they cannot admire landscape or artistic effects so long as the roads are impassable, and they prefer to spend money in building the roads first and to develop the beautiful later.

This objection cannot be urged against saving what is already there, and much of this can be saved, not only without additional cost, but actually at less cost because of the low expenditure for clearing and grubbing. We should not, however, allow beauty to interfere with safety. It is a small solace to the injured or to the families of persons killed that accidents occur in, and are due to, beautiful surroundings.

Oaks are probably more generally satisfactory for street planting than any other group of trees, followed closely by elms and sycamores. Palms do not make good shade trees, though they are sometimes appropriate for formal effects. The silver and ash-leaved maples and the poplars are not often satisfactory.

House Numbers on the Curb

By Albert Marple

SOMETHING entirely new in the way of a location for the house number has just been introduced in the West. This idea is shown in the accompanying illustration and consists in placing the number on the side of the curbing in front of the home. This plan is of particular benefit to the person who is trying to find some particular dwelling while riding in an automobile or other vehicle, and would be worth thousands of dollars a year to merchants whose employees are called upon to make deliveries during both night and day.

Heretofore house numbers have been placed at any point that suits the personal desires of the home owner. The number of one house may be above the porch, of another, on the porch railing, and of still another, on one of the posts of the porch or beside the door. There has been no attempt at uniform numbering of homes. It has been done in a haphazard manner so that anyone desiring to locate the number of any particular dwelling has little idea where it may be found. If the curb home number was universally used, it would be a simple matter to locate any home at any hour.

These 6-inch numbers are stenciled on the curb with lampblack and oil and when once placed there will last for years. Prior to the stenciling operation the curbing is cleaned perfectly with a stiff steel brush.

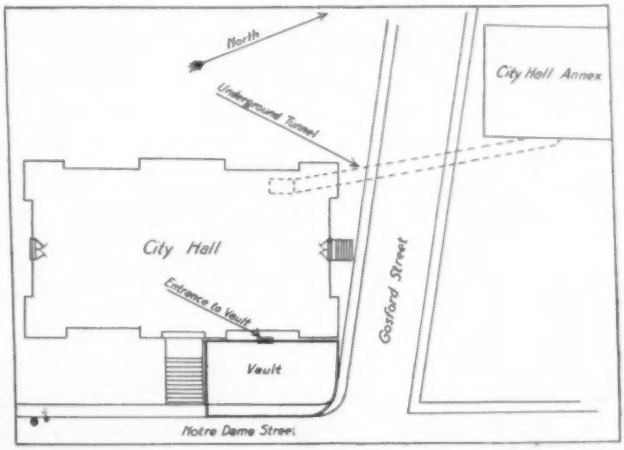
A HOUSE NUMBER WHERE THE DELIVERY MAN CAN SEE IT

It costs just twenty-five cents to have the complete number stenciled on the curb.

Lessons from the Montreal City Hall Fire

Lack of Fire Protection Facilities Causes Loss of Building, But Underground Vault Protects Valuable Records

LAST March the Montreal City Hall was added to the long list of large public buildings which have been destroyed by fire. The fire, of unknown origin, completely gutted the large structure, the estimated loss being over $500,000. Unfortunately, no insurance was carried, so that the loss is a direct tax on the people of the city, with the exception of a municipal fund which has been set aside during the last few years to cover any possible loss.



PLAN OF CITY HALL, SHOWING LOCATION OF VAULT AND ANNEX

According to the report of D. C. Winsor in the *Quarterly Journal* of the National Fire Protection Association, the fire was discovered by the night watchman and an alarm turned in, which was received at fire headquarters at 11:44 P.M. The second alarm was sounded at 11:51, a third at 12:02 A.M., and a fourth at 1:08 A.M. A total of 29 hose companies, 24 ladder companies, 13 steam fire engines, 4 motor pumpers, 6 salvage wagons, 1 water tower, and 2 siamese wagons, besides the usual fuel wagons, etc., were in attendance. Forty streams, using 26,000 feet of hose from hydrants and engines, were used, besides the water tower; 3,069 feet of ladders were raised, and 250 salvage covers spread. A large number of covers and abandoned hose lines were lost when the roof and floors collapsed.

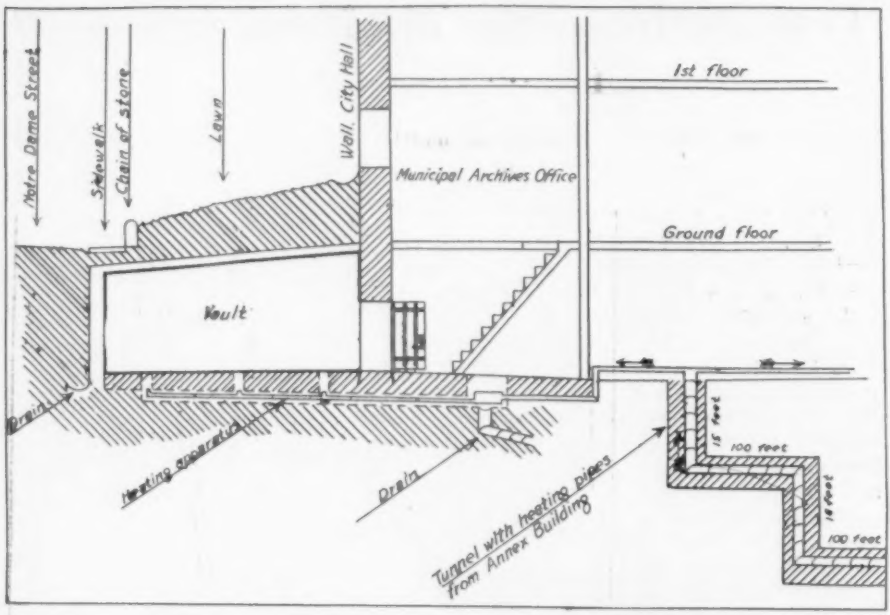
The fire spread through the roof and to each of the towers and all were destroyed; the last tower to go was the southwest, where the fire was stopped before it burned down through the floors. With the collapse of the various towers and the roof, the floors were carried through to the basement, and practically only the walls of the building and the towers remained. The floors of the tower that was saved were afterwards carried down by the collapse of a large chimney during a strong wind a few days after the fire.

There are two lessons to be drawn from this fire: first, it serves as another illustration of the folly of this type of heavy joist construction, especially for large public buildings; and, second, it shows the value of well-designed fire-proof vaults for the storage of priceless records.

Features of the Underground Vaults

The vault is entirely constructed outside of the foundation of the City Hall and under one of the lawns and the sidewalk situated in front of the building. A single entrance door of the burglar-proof type, situated inside of the foundations of the building, gives access to the vault, the floor of which is one foot higher than that of the cellar. The inside dimensions of the vault are 100 x 80 feet, with an average height of 12 feet.

A heating system is installed in concrete



SECTION SHOWING PORTION OF CITY HALL AND VAULT

conduits which are laid slopewise under the floor in order to facilitate the flow of the water that might gush out in case any part of the piping should break. A drain is laid at the lowest point of these conduits. There is also an outside drain which conveys water from the adjoining ground to the main sewer.

Air spaces are provided for in the floor, walls and roof by the combined use of terra cotta, concrete and steel. Each of these air spaces has a condensation drain. All proper attention was given to the waterproofing of the exterior parts, a special material being used, together with 5-ply felt. Ventilation is secured by means of a fan and motor.

The roof was constructed so as to withstand the weight and impact of the walls of the City Hall, in case the latter should collapse. It has a sloping top which allows rain water, melting snow, etc., to flow towards the roadway.

The construction, which was begun in 1919, was completed in 1920 at a cost of $55,000; $40,000 additional was spent for metallic equipment for the vault.

The City Hall is situated at the top of a hill, near which is another building, known as the "City Hall Annex," which was erected only a few years ago on the side of the hill at a level 30 feet lower than that of the main building. A tunnel, 200 feet in length, the inlet of which is on the same level as the floor of the cellar of the Annex, connects the City Hall with the Annex. When the fire broke out, this tunnel allowed the immense quantities of water which were poured on the flames to find their way to the Annex, the cellar of which was submerged, thereby preventing the vault adjoining the main building from being flooded. This is one of the main reasons why the vault was constructed on its present site. The vault was opened on the second day after the fire and showed no signs of water infiltration, and the documents were found to be intact.

We are indebted to P. L. N. Beaudry, Archiviste, for the information regarding the underground vault and the sketches used to illustrate this article.

City officials must take care to erect municipal buildings or replace burnt structures with those that will resist fire ravages and that, in themselves, will be non-inflammable.

The School Lunch in Rural and Urban Districts

A Study of Conditions, with Recommendations for Their Improvement

IN the first selective draft, 28 per cent of all of the men called were rejected as unfit to bear arms. Many were under weight, many showed signs of undernourishment. Others were suffering from defects which should have been corrected in childhood. A large number of these might have been avoided if proper precautions had been taken. The child who is properly nourished runs far less chance of contracting contagious diseases, and the results are less serious than in the undernourished child.

Statistics gathered recently in New York City showed that at least one-third of the children in the public schools were so much below the normal standard of growth as to call for special nutritional care. It is probable that these figures are representative of other large cities. Recent reports concerning the condition of children in the country schools of Iowa indicate that these are no more physically fit than city children. A country nurse found 23 out of a class of 29 more than 10 per cent below weight, and another reports from a rural school that all were more than 10 per cent below standard. A recent summary of reports on over 10,000 Iowa school children shows that 20 per cent of the city children are seriously under weight, and in the rural schools 30 per cent of the pupils are in this classification.

It is apparent that there is need of much greater care of the children, both for the future well-being of the race and the happiness of the individual.

Faulty home and school hygiene, infections, diseased teeth and tonsils and enlarged adenoids are common causes of undernutrition among children, and all such conditions should be remedied. But the most frequent cause is wrong food, sometimes too little, but more frequently too little of the right kind. Children suffering from undernourishment are found not only among the poor, but also among the well-to-do.

Extension Bulletin No. 70, University of Iowa, gives a valuable discussion of the selection of food for children and a number of suggestions for the school lunch box, chiefly appliable to the parents and the home. This is followed by a treatise on the supplementary hot dish in the rural school.

EXPERIENCE THE TEACHER

Experience has shown that where hot lunches have been introduced, there has been better attendance on the part of the children because of their better physical condition. There have been fewer failures, and the average class grades have been higher. The money spent on the re-education of backward children or the repeating of grades of courses might far better be spent in making possible the hot school lunch. Mental efficiency is dependent upon physical well-being. A child's brain cannot work if he is not supplied with the proper food. A tired, inactive child has a tired, inactive brain.

The Lunch of the Rural School Child

The usual lunch box fare which a child has at noon does not contain all of the needed food materials. It is not easy to include day after day all the foods which the child should have. For example, dishes which carry an adequate amount of milk are difficult to carry. Vegetables are seldom included, for similar reasons. In order that the child may be adequately fed at noon, some means should be introduced in every rural school for providing at least one hot dish. Fortunately, milk, one of the foods which make the lunch which the child brings from home more nearly complete and well-balanced, is most available in the country. Milk is not easily transported in the lunch boxes and there is no way of keeping it in the school; therefore, the supplementary hot lunch dish in general should be made largely of milk. The following dishes are suggested for hot dishes during a four-weeks period. All of these are so

simple in their preparation that pupils of the upper classes may do all the work involved with but little instruction from the teacher.

The menus are so arranged that on Mondays dishes which require the least time to prepare are served. On other days in certain cases it may be necessary to start the preparation the afternoon before.

THE SUPPLEMENTARY HOT DISH

Week	Monday	Tuesday	Wednesday	Thursday	Friday
I	Cocoa	Cream of bean soup	Scotch broth	Cream celery soup	Scalloped corn
II	Cream potato soup	Scalloped rice and cheese	Scalloped potato	Vegetable soup	Fish chowder
III	Cream corn soup	Cream of chicken soup	Cocoa	Cream spinach	Corn meal or rice or hominy with milk
IV	Cream tomato soup	Delmonico potatoes	Cream pea soup	Salmon soup	Corn chowder

How to Obtain Supplies

The method of obtaining the food material for the noonday meal must be worked out by the individual community. In general, it is better for each child to pay enough for the individual lunch served to cover the cost of material. In certain instances the cost of material may be defrayed by the school or by a local organization, or the necessary food material may be brought from the homes by the individual pupils, each home in turn being responsible. If the latter method is adopted, it will be necessary for each mother to know beforehand on just what day she is to furnish the material, so that she may make her plans accordingly.

Whatever method is adopted, it must be such that every child will receive his share of the food furnished. In country homes it frequently happens that food is more abundant than pennies, and the child who cannot pay for his lunch in money may be made uncomfortable. For this reason, the first method suggested is least desirable. It must not be forgotten that children are quite as sensitive as adults, if not more so, and under no condition should the child who has little be made uncomfortable because he is unable to cooperate in the same way as the other children. The main purpose of the noonday lunch is to make the children more nearly physically fit. The arrangements must be such that all children may share equally. Increase in the school budget incident to the introduction of school lunches decreases the cost of education, because there will be fewer failures and fewer children repeating grades.

Equipment for the Rural School Lunch

The equipment for the noonday lunch will vary with the type of school. The individual equipment, bowl, cup and saucer, etc., may be brought from home. Less confusion will result, however, if all is owned by the school.

EQUIPMENT FOR THE RURAL SCHOOL

1 coal oil stove
1 portable oven
1 aluminum or granite kettle, 8-quart
1 saucepan
1 saucepan, 2-quart
1 double boiler, 6-quart
4 white enameled bowls
  2 2-quart
  1 5-quart
  1 pint
1 ladle, long handle, holding one cup
4 spoons
  2 tablespoons
  2 teaspoons
1 meat grinder
3 knives
  1 butcher
  1 paring
2 forks
  1 small
  1 large
2 strainers
1 wooden spoon
1 scrubbing brush
1 can opener
1 baking dish, 3-quart
1 dipper
1 teakettle
1 water pail
2 trays
4 dish-towels
2 dish-cloths
1 "Mystic Mit"
1 dish-mop
2 dish-pans
1 dish-drainer
24 cups and saucers
24 soup bowls
24 serving plates
24 soup spoons
24 teaspoons
24 forks
1 quart measure
1 asbestos mat
1 Dover egg beater
1 measuring cup
1 wire potato masher
1 fireless cooker
  (This may be made by the class in manual training)
6 pkgs. paper napkins (500 each)

A cupboard for holding the necessary materials and cooking equipment may be built into the lower part of a kitchen table, if a kitchen cabinet is not possible. The top of the table may be covered with white oilcloth. A one-compartment fireless cooker will help materially in decreasing the labor involved in preparing the lunch. The equipment listed above is planned for a class of 24. By adding more serving dishes, it may be made to serve double the number. Bak-

PUSH-CART LUNCHES ARE UNSANITARY AND UNWHOLESOME

ing powder tins, mason jars or tin cracker boxes may be used for supply containers.

Serving the Hot Dish

It is almost as important to teach children how to eat as to teach them what to eat. Most of the actual cooking will need to be done before the lunch period, the preparation being done before school. At the close of the last recitation there should be a few minutes for exercise before the food is served. Discipline should be relaxed, hands washed and desks made ready for the noonday meal. A paper napkin may be placed on the desk, and the bowl and cup and saucer and the requisite utensils arranged in an orderly manner. The girls responsible for the hot dish may act as waitresses. It is convenient to serve the cocoa or cream soup from a pitcher. The scalloped dish may be served in suitable dishes and passed on a tray.

Although a certain amount of discipline must be maintained during the lunch period, there should be considerable freedom. It may be necessary to teach table manners, but this should be done in such a way as to make no one unhappy. Scientific investigations have taught us that a cheerful environment at meals materially aids digestion.

It is a common fault among children to eat too rapidly and to use water to wash down improperly masticated food. Water may be taken freely with meals, but it should be taken between bites and not when food is in the mouth. A word from the teacher with an explanation of the effect of too rapid eating will do much toward forming good eating habits. After lunch the desks should be put in order, the dishes placed on the service table, washed and put away.

Noonday Lunches in City Schools

It is as important that the school lunch be introduced into the city schools as in the rural schools, for here are many children who for various reasons cannot go home for the noonday meal. Sometimes the distances are too great; often the mothers are away all day working in the factory or shop. The children are given a few pennies with which to buy food; this is spent at the corner grocery for pickles, candies and other sweets or at the push-carts for unsanitary and unwholesome food. Not infrequently it has been found that even in the homes to which the children return at noon the meal is inadequate. Many mothers fail to appreciate the full significance of food for children and serve a light lunch, preferring to prepare the more hearty meal in the evening when the father is at home. Moreover, the noon recess in many instances is far too short. In order to get back in time for the afternoon session the children eat their lunch hurriedly, a condition which results in the taking of too little food or in improper mastication.

In the small city or the consolidated school, one lunch may be served to all. When children eat together, especially when there is a certain amount of competition

THE SUPPLEMENTARY HOT DISH IN THE RURAL SCHOOL

introduced relative to gain in weight, food prejudices are quickly overcome. No child desires to be smaller and less strong than his companions. Weekly weighing and plotting of growth curves will help materially in getting children to eat food which makes for growth. In these schools the noonday lunch is frequently directed by the domestic science teacher.

Where more workers can be employed, as in the larger schools, there may be served a variety of lunches, each so arranged as to fulfill dietetic requirements. To allow children to select their lunch from a variety of dishes is unwise, for it has been demonstrated that man's instincts fail when it comes to food selection. Only the child trained in right food habits will select milk instead of candy. Menus served should be simple and wholesome. As in the rural school, whole milk, not canned, should be used freely in the preparation of the dishes, for the amount of milk which the average school child takes is far too little.

The following menus are suggestive of what may be served at any school at very low cost:

Cream pea soup	Vegetable soup
Bread-and-butter sandwiches (2)	Egg sandwiches (2)
Apple sauce—cooky	Rice pudding
Cream of bean soup	Macaroni and cheese
Browned crackers	Jelly sandwiches (2)
Apple tapioca pudding with top milk	Cocoa

During the pre-adolescent period (11 to 14 years) both boys and girls need more food than is often considered necessary. The ravenous appetites at this period are an expression of physiologic needs. Lack of appreciation of this and failure to provide enough food explain in part the undernourishment of school children. Therefore, in planning the luncheon menus, provision should be made for the purchase of larger quantities. For example, in menu No. 1, although two sandwiches are the usual number served, the child should be able to buy more, allowing some variety.

The lunch room in the large school can best be handled by trained women who understand the food needs of children. The management should be under the direction of the school authorities. In general, the price of the lunch should cover the cost of the food, the overhead charges being borne by the school.

The Mid-Morning Lunch

Children who are greatly undernourished or who are suffering from certain forms of disease need a mid-morning lunch. In general, this should consist of milk and a bread-and-butter sandwich or a bowl of warm milk soup and a cracker. In large cities these children are frequently assembled in one school where special provisions are made for feeding them. Where such children are not segregated, other means must be devised. In schools where there is a cooking laboratory the mid-morning lunch may be served here. In other schools arrangements may be made between the home and the school. The important thing to remember is that these children must be fed and that the mere question of inconvenience should not be allowed to stand in the way of the child's getting the required food.

The One-Session School

Throughout the United States there are a large number of high schools and an increasing number of elementary schools which have but one session. These usually begin at 8 or 8:30 A. M. and last in some cases until 1 or 1:30 P. M., and in others until 2:30 P. M. From 20 minutes to half an hour is the usual recess period. In a few of these schools a hot lunch is furnished; in others, it is possible for the children to purchase milk, cocoa, sandwiches, sweet chocolate, etc. Many of the schools make no provision for furnishing lunches. In these the children either bring their lunches or eat what a near-by grocer or street vendor can supply, or they eat nothing until they return home. In the latter case, when the child reaches home he is often tired from lack of food. The family has eaten at the usual time, between 12 and 1. His meal has been kept warm, it is frequently dried and he must eat alone. The result is that only the food which appeals most strongly, the meat and the sweet, is eaten.

If school boards see fit to make the one-session period the order of the day, they must be equally zealous in making provision for the hot noon lunch, and sufficient time, not less than forty minutes, should be allowed for this. Experience has shown that where hot lunches have been introduced, there has been better attendance on

the part of the children because of their better physical condition. There have been fewer failures, and the average class grades have been higher. The money spent on the re-education of backward children or the repeating of grades or courses might far better be spent in making possible the hot school lunch. Mental efficiency is dependent upon physical well-being. A child's brain cannot work if he is not supplied with the proper food. A tired, inactive child has a tired, inactive brain.

ACKNOWLEDGMENT.—Illustrations by courtesy of University of Iowa Extension Bulletin, Iowa City, Iowa.

A Great City-Planning Project on the Pacific Coast

By Charles H. Cheney
City Planner

THE largest single piece of city planning by private enterprise ever undertaken in this country for permanent development will be the new Palos Verdes Project in Los Angeles, now being financed through nation-wide underwriting. We have the great example of Washington, D. C., and possibly one or two other cities well planned in advance and built by public enterprise, and our great expositions have furnished stirring object-lessons in what can be done for temporary dream cities by working to a carefully thought-out plan. Now what city planners have long been urging for permanent city building seems likely of early accomplishment.

The Palos Verdes Project contemplates a new suburb which, though much larger, will be similar to Roland Park, Baltimore, Forest Hills, L. I., St. Francis Woods, San Francisco, etc., except that there will be a greater proportion of low-priced homes and home-sites. A marvelous piece of ground has been secured, containing 16,000 acres (25 square miles) and including almost 14 miles of ocean shore, at the southwest corner of the Los Angeles metropolitan area, with Catalina Island opposite.

The underwriting calls for a total expenditure of $35,000,000, work to proceed as soon as $15,000,000 of this amount is available. Several million dollars has already been subscribed, and it is expected that the fifteen-million mark will be passed this summer. Preliminary estimates of improvements include the following items:

Home building fund	$5,000,000
Streets and roads (125 miles concrete-paved)	6,000,000
Sewers	1,800,000
Water system	1,650,000
Cost of land	$5,000,000
Ornamental plantings, Art Jury endowment	1,300,000
Hotels and clubs	2,000,000
Parks, schools and playgrounds	2,000,000
Three civic centers with business blocks	3,000,000
University	1,000,000
Transportation	4,000,000
Unapplied, taxes, etc.	2,250,000
Total	$35,000,000

The $5,000,000 home building fund is expected to finance the building of several thousand houses, arrangement for second mortgage loans being provided in the trust agreement, and title already being held to the land. It is proposed to use part of this sum for the organization of copartnership housing, similar to that in England, in order to furnish working men's homes in quantity on easy terms, and with maintenance and up-keep provided. No buildings can be built anywhere on the property unless the plans are approved by the Art Jury, which will be a permanent body, endowed with sufficient funds to do real work. Restrictions will be similar to those of Roland Park, Baltimore.

The staff appointed to develop the project includes Olmsted Brothers of Brookline, Mass.; Charles H. Cheney, city planner; H. T. Cory, chief of engineering; Hunter Liggett, supply service; Myron Hunt, chairman Art Jury, and others of national reputation. All funds are held and administered by the Title Insurance and Trust Company of Los Angeles, as trustee.

Preliminary to the adoption of any general city plan, a committee of the staff will this summer visit and check up on the principal city planning and housing schemes of the country, in order to take advantage of as much previous experience as possible.

Underground Leakage—Its Relation to Mains and Services

Results of Careful Surveys in Chicago Given in Detail

By Thomas F. Wolfe

ONE of the most convenient ways of reporting underground leakage in flow lines and distribution systems is to say it is so many gallons per day per mile of pipe, or is so many gallons per day per foot of joint. Either of these figures is a fair indication of the efficiency of the transmission system only when there are no service connections to it. As soon as other means for water to get away are introduced, it is absolutely unfair to report or consider leakage as a function of the length of the main. Unfortunately, a better system does not readily offer itself, because of the way in which leakage figures are arrived at. It is also unfortunate that the method of arriving at the amount of water lost in transmission involves so much guesswork, because the lack of accuracy is responsible to a great extent for the fact that large water losses are so easily condoned.

In determining the amount of water getting away underground, the usual way is to account for all that is fairly measurable and then to ascribe the remainder to leaks. This involves considerable estimating, and the net result, as far as unaccounted-for water is concerned, is nothing more than an estimate and on account of its unreliability is not taken as seriously as it should be. In fact, many water-works men have come to look upon a large underground loss as a legitimate expense and, consequently, to disregard it. In reality, there is small excuse for this condition, because it is a fact that pipe can be laid so that it will be almost absolutely tight, and if proper material and workmanship are used, there is no reason why the pipe cannot remain tight indefinitely.

In looking over water-works statistics, it is not at all unusual to find many systems reporting losses of from 20 to 50 per cent of the water pumped. If this were true of those cities and towns where water is still sold on a flat rate basis, it might be ascribed to waste within the premises. As a matter of fact, such is not the case and many towns that are 100 per cent metered are unable to account for the entire pumpage without charging off a considerable percentage to underground losses. Possibly, all leaks cannot be eliminated, but a more serious consideration of the reason for leaks will at least greatly reduce the percentage of unaccounted-for water.

Tests in Chicago

The thought that services are responsible for a large part of the water loss is not at all new, but it may be worth while to consider some accurate data pointing out the truth of this statement. Tests of parts of the underground system in Chicago, made either by the writer or under his direction, give some interesting data in this connection. A test was made on the Stock Yards in Chicago, where it was comparatively simple to measure the total flow in the district under test and where practically the entire consumption was metered. The Stock Yards occupy an area of about one mile square, the eastern half of which is occupied mostly by cattle-pens and is not supplied with city water. The remainder of the Yards is closely built up with packing plants, where great quantities of water are used. Every service in this entire district except those supplying fire engine houses and public drinking fountains is metered, and with the exception of a few ¾-inch services supplying elevated stations and isolated buildings, all are of cast iron. In other words, this might be considered as a system free from service leakage, as the services themselves are constructed in exactly the same manner as the mains.

In conducting this survey, the mains carrying water into the Yards were shut down with the exception of two 24-inch mains, one carrying water from the Twenty-second street pumping station, the other

from the Sixty-eighth Street pumping station. This created a number of dead ends, and in order to avoid any danger from a limited supply in case of fire, a man equipped with a valve key was stationed at one of the fire engine houses within the limits of the Yards, with instructions to operate such valves as would increase the supply in case of fire. It so happened that during the period of the test, no fires originated in this territory; consequently, the valve arrangement was not disturbed. Pitometer taps were installed on each of these two supply mains and traverses were very carefully run. All meters were read at the beginning of the test, and the reading was repeated at the end of the run and the daily rate of consumption established from these readings. According to the pitometer, the rate of consumption varied from a minimum of 6,960,000 gallons per day to a maximum of 24,100,000 gallons per day, and the pressure from 24 pounds to 37 pounds. The daily rate of consumption was plotted on a curve and the average daily rate computed. This was found to be 14,562,000 gallons per day. The rate as shown by the meters was 13,782,000 gallons per day. This leaves 780,000 gallons per day to cover the following items:

	Gallons per Day
Service to three engine houses	21,600
Two continuous drinking fountains	14,400
Hydrant leakage	*35,100
Water used from fire hydrants for street washing	10,000
Meter slippage (estimated at 2½ per cent)	366,000

* Based on average hydrant leakage all over the city.

This leaves 2.28 per cent of the total flow into the district unaccounted for. The figure indicates that, with service pipe leakage eliminated, the amount of unaccounted-for water is negligible.

We will now consider tests made on various streets in districts where conditions are different; that is, instead of an all cast iron system, we have a cast iron main and service pipes of other material. For the past five years, it has been the practice in Chicago to test each street for leaks prior to laying pavements. Not only are the tests made, but the leaks are located, and over 92 per cent of the water found getting away in these streets has been stopped. This intensive leakage survey naturally brought to light the exact nature of the leaks. The streets tested can be considered average cases, because in some the mains and services were just laid, while in others the pavements to be laid were replacing other pavements that had been worn out and the mains in these streets were from twenty-five to seventy years old. The tests are conducted in the following manner:

The section of main to be tested is shut down and all services shut off at the roundway at the curb. A 1-inch meter (or where the section is large, a 2-inch meter) is then by-passed around one of the closed valves through a 2-inch hose connected to 1-inch corporation ferrules installed on either side of the closed valve. If any leakage is indicated, an aquaphone is applied to a shut-off rod on each roundway, and as a rule, if the leak is in any place on that particular service or on the main near the service, it can be easily heard. With experience, a man can tell about where a leak is by the relative loudness of the sound on adjacent services. If there are no services on the main, or for some reason the location of the leak cannot be determined as described above, a 1-inch earth auger is used to bore a hole down to the main itself. An aquaphone applied to rods in these holes will pin the leak down to a very small space. This method obviates digging numerous test holes in order to determine leak locations and has been used quite successfully in paved streets where the only opening in the pavement is that caused by driving a bull point through it. If the leakage is particularly difficult to locate, the main is cut in two and patent plugs similar to those used by plumbers in testing house drainage systems are installed in place of the pipe cut out. The water getting away in the section between the meter and the plug is then measured and in this way the section in which the leakage occurs is located. In cases where the valves are not located in such a way as to make it possible to isolate the section desired, the main is cut at the limits of the section to be paved and these plugs are used.

Analyzing the Results of the Tests

During the year 1921, 78½ miles of streets have been tested in this way and 1,091,000 gallons per day of leakage measured; 1,070,990 gallons per day, or 99 per cent of the total leakage, has been stopped. Of this amount, 92,000 gallons per day was stopped by abandoning the main. This

main lay under the street car tracks in a down-town streeet, and because of dense traffic it was cheaper to lay new main. The remainder of the leakage was divided as follows:

	Gallons per Day
Service pipes	648,878
Joints	65,161
Hydrants and valves	259,751

The hydrant and valve leakage is excessive, because, in spite of ordinances to the contrary, hydrants are subjected to considerable abuse on account of being used by building, paving and sidewalk contractors and others for construction purposes. The service pipe leakage of 648,878 gallons per day, or 60 per cent of the total underground loss, was found to exist mostly in wiped joints. This figure on service pipe leakage is somewhat lower than it should be, because of the fact that, prior to making these tests, it is customary to cut off all wrought service pipes and replace them with lead service pipes. It is impossible to estimate how much additional leakage would have been measured had these rusted-out wrought pipes been included in the survey, but as most of these pipes are in bad condition, it is reasonable to suppose that this figure would be materially increased. It should also be borne in mind that this includes only that part of the service pipe leakage between the main and the roundway and that leakage in these pipes between the roundway and the premises is not included. In Chicago, wrought pipe is often used by building contractors between the roundway and the house in the effort to keep first cost down, and experience has shown that these pipes have a very short life and are responsible for a great part of the underground losses.

From these figures, it can be seen that less than 7 per cent of the leakage is charged in any way to the main and none of this is due to leaks in the pipe itself. If the total leakage in these streets were reported in gallons per day per mile of pipe, it would be 14,000, whereas the actual leakage in the main itself was 830 gallons per day per mile of pipe, or less than is often specified for new pipe. For the entire period of five years, 350 miles of pipe have been tested, 7,038,000 gallons per day of leakage measured, and 6,510,000 gallons per day, or 93 per cent of leakage, stopped.

The oldest main tested since this system was adopted was a 12-inch cast iron main laid in State Street in 1852. This main is part of the first main laid in Chicago after the use of bored logs was discontinued. The section of this main tested was 1,500 feet long and was found to be absolutely tight. There were only three services off of this main and they were all cast iron. A 6-inch tap made for the purpose of connecting a hydrant to this pipe made it possible to inspect the interior as well as the exterior of the pipe, and there was very little evidence of corrosion. It is not known what the original thickness of this pipe was, but the thickness at present is greater than the present Class "C" pipe.

A scheme of reporting leakage in complete distribution systems better than now used, is not readily offered. At least this can be done—when leakage is reported as so many gallons per day per mile of pipe, it should be noted whether or not this includes leakage from services. The figures mentioned above indicate that it would be more fair to say the leakage in a distribution system is so many gallons per day per service than it is to say it is so many gallons per day per mile of pipe, as the services were shown to be responsible for ten times as much leakage as was the pipe.

Acknowledgment.—From a paper read at the American Water Works Association Convention, Philadelphia, May, 1922.

Infant Mortality Rates in Cities

It is a striking fact that the group of cities of over 250,000 have constantly maintained, as a group, a lower infant mortality rate than the smaller population groups. Many smaller cities pass them individually, but the fact remains, it is in the larger cities that the greatest efforts are being made to combat infant mortality and its chief and preventable cause—ignorance.

—Phillip Van Ingen, M.D., in *The Survey*.

Mosquito Control Through Lined Drains

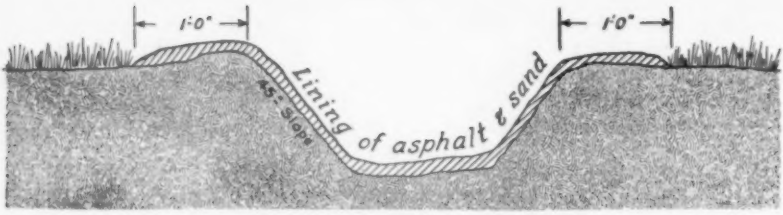
Use of Sand and Liquid Asphalt for Permanent Drains and Edges of Pools

IN a recently issued pamphlet, the Government Medical Officer of Health of Trinidad, British West Indies, has described an interesting and valuable method of mosquito control by the use of liquid asphalt and sanitary oil. This method was adopted in Trinidad after the usual methods of using drains to carry off the rainfall, of spraying pools with crude oil, and keeping the brush and grass cut within the area to be protected, proved inadequate. It was found that the ordinary drains were very expensive to keep clean and clear of grass, and the scouring action of the tropical rains soon eroded the bottom and sides of the drain, making them breeding-places for mosquitoes. It was further found that crude oil was not entirely satisfactory as a spray for pools, as the more volatile portions of the oil evaporated very quickly and the resulting film was soon broken up by wind or rainfall.

After repeated experiments, a satisfactory method was developed for lining the bottom and sides of the drain with a hard water-proof lining of asphalt and sand, which prevents the growth of grass or other vegetation in the drains and resists the scouring action of heavy rains. The principle involved in this method of lining drains is that a mixture of liquid asphalt and sand when heated to a high temperature and then allowed to cool will volatilize its lighter constituents, and the residue will be a hard asphalt-and-sand wearing surface. In practise, the heat is generated by burning the liquid asphalt and at the same time spraying sanitary oil on the blaze to provide the necessary heat required to volatilize the lighter constituents of the liquid asphalt.

SPREADING LIQUID ASPHALT IN DRAIN

BURNING LIQUID ASPHALT WITH SANITARY OIL SPRAY



CROSS-SECTION OF DRAIN AFTER LINING

Preparing the Drain for Lining

After the bottom and sides of the drain are cleaned and graded and all grass is cleared away for a distance of one foot on both edges of the drain, liquid asphalt is spread uniformly over the bottom and sides of the drain and for about one foot on each side, as shown in the diagram. The liquid asphalt should be applied at the rate of one gallon per square yard of drain surface and can best be spread by pouring from a hand-pouring pot provided with a special spout with an adjustable slit opening. Sand is then sifted over the surface of the liquid asphalt at the rate of 1 cubic foot for 8 square yards of surface. The liquid asphalt at once absorbs the sand. Fire is then started in the drain by means of a piece of oily waste or dry straw, and sanitary oil is sprayed on the fire by means of a hand pump spray, as shown in the larger illustration.

The fire soon spreads and ignites the liquid asphalt, which burns with an intense heat, the fire traveling along the drain with the wind. Where combustion is not complete, sanitary oil is sprayed on the flame to assist the combustion. In practise, 1 gallon of sanitary oil is used for 10 square yards of surface burned. On cooling, the drain is found to be lined with a hard, permanent asphalt-and-sand wearing surface about one-half inch in thickness, which adheres firmly to the underlying soil. This lining resists the scouring action of the flow of water in the drain and prevents the growth of vegetation.

The slide slopes of drains are made preferably with a 45-degree slope, but in firm clay formations, drains with nearly vertical sides have been successfully lined. In drains with steep side slopes, it is impossible to get a thick coating of liquid asphalt on the sides. Nevertheless, the intense heat generated in the drain has the effect of baking the clay to a degree of hardness which will resist scour and prevent the growth of vegetation.

Treatment of Pools

In treating pools that cannot be drained, the edges are burned and lined with asphalt and sand, as described for drains, and the surface of the pool is sprayed at intervals with sanitary oil. By the use of the methods explained above, mosquitoes have been exterminated from the Brighton Sanitary District, and the maintenance cost of upkeep of drains has been greatly reduced.

Limitations of Method

The work of lining drains as described must be done when the drain is dry. Drains in which water is flowing continuously throughout the year cannot be lined by this method unless the flow of water is temporarily diverted and the drain allowed to dry. Owing to the intense heat generated in lining drains, care should be exercised to insure that fire from the drains does not spread in dry grass or underbrush. On account of the fire hazard the lining of drains in towns and village streets cannot be undertaken by this method. In suburban and country districts, however, the lining of drains with liquid asphalt is particularly applicable and has proved effective and economical.

Only vigorous trees that will withstand the adverse conditions in the city should be planted on a street. The habit of growth should be suited to the width of the street, and the foilage should be of a pleasing texture.

Preparing Wells for Pneumatic Pumping

Three Methods for Use When Log of Well Is Unknown Described in Detail

IT is very rare for the pumping engineer to find a complete record or log of a well, even though wells are exceedingly important in a great many municipal water-works plants. The contract for driving a well seems to be let in a haphazard manner, with no record required from the drillers as to what class of material has been penetrated, where it was located, or its thickness, to say nothing of the size and kind of casing and strainers used. It is no uncommon thing to go into a well that has been represented to be of a certain size to the bottom and find that it has been reduced sometimes more than once. It entails considerable loss of time and expense to secure equipment that will go into such a hole. A driller should be required to furnish a complete log, which should be as carefully preserved as the deed to the property.

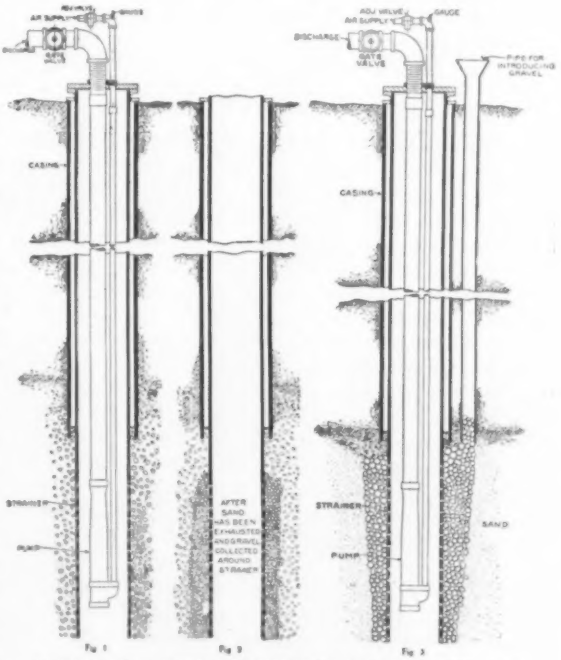
Constructing a Well in a Sand or a Sand-and-Gravel Formation

The standard practice of well drillers is to equip gravel and sand wells with a strainer, designed to shut out the sand from the working barrel of a deep-well pump. In time these strainers become clogged with sand, and the flow into the well is then reduced. By a system of back-blowing the output from such wells can be permanently increased.

The correct strainer for wells of this class, pumped by the air lift, is a perforated screen with openings of a suitable size to admit the fine material into the well, from which it can be pumped, and to hold back the coarser particles, so as to form a natural gravel filter bed outside of the artificial one.

The force available for getting water into a well is the head, due to the difference between the static level in the water strata outside the well and the pumping level in the well, minus friction due to the strata and screen. Therefore, the more this friction can be reduced, the greater will be the flow, providing, of course, that an abundance of water is available.

Back-blowing can be applied to all wells operated by air lift. The top of the well casing should be sealed, then, by closing the discharge pipe while the air lift is in operation, the air will be forced through the foot-piece and will drive the water ahead of it through the strainer and float the finer sand. Then, by opening the discharge, the flow will resume its course toward the surface and bring a portion of the floating sand with it. By a repetition



THREE METHODS OF INCREASING THE FLOW OF DEEP TUBE WELLS

of this operation and by increasing the back pressure if necessary, practically all of the fine sand immediately outside of the strainer will be drawn into the well and discharged at the surface, and the coarser gravel will be collected outside of the screen in such quantities as to shut off the sand and increase the flow into the well without changing the piping in the well. This process may be repeated at any time, so that the screen and adjacent strata can be kept clear.

In Rock and Quicksand

When wells are drilled in rock, the action of the drilling tool forces the cuttings back into the crevices of the rock. These may be loosened and pumped out of the well in the same manner.

In the case of wells in fine material and quicksand, it is often possible to set a strainer in the sand and drill auxiliary holes alongside the well down to the top of the strainer. Then foreign gravel may be dropped down, which will roll in alongside the screen and take the place of the sand pumped out, often increasing the yield fourfold by affording outside of the gravel bed a larger area through which the water may leave the sand.

The illustrations on page 53 show wells constructed under the three conditions mentioned: First, a well with a properly constructed strainer for air lift work, placed in a mixed layer of sand and gravel. Second, showing the gravel collected around the strainer after the finer sand has been drawn into and pumped out of the well. It will be readily seen that this treatment forms a "gravel" strainer outside of the metal one and greatly increases the inflow area, keeps the openings of the screen full and open, and greatly increases the capacity of the well. Third, where the water-bearing layer consists of fine sand or quicksand, it is sometimes necessary to introduce gravel through one or more auxiliary holes drilled near the main well and terminating in the top of the sand layer, so that when the sand is removed by back-blowing, the gravel will roll in around the screen and form a gravel screen outside the metal one, as in the first instance. The gravel selected should be clean and practically round and of a size from that of a small walnut up to one which will pass through a 2-inch mesh.

ACKNOWLEDGMENT.—From a paper by John Oliphant, Chief Engineer, Pneumatic Pumping Department, Sullivan Machinery Company, Chicago, Ill., read at the American Water Works Association Convention, 1922.

City Transportation and the City Engineer

THE traffic on the highways of our cities has grown so rapidly in the past few years, especially since the advent of the automobile and motor truck, as to become a serious problem, claiming the earnest attention of the authorities. As our cities continue to grow, and as trade and business continues to be increasingly concentrated at one or more centers, the problem of transportation of all kinds through the city becomes more difficult. The economical administration of industry and the transaction of business in cities are dependent on the ease with which materials and merchandise may be moved, for modern business requires that transportation shall be by the most direct route and in the shortest time.

Inseparately interwoven into the street system and its functions are the facilities of transportation, whether they relate to the local movement within the city itself or to that wider movement through which the city maintains its contact with the world. Transportation is essentially a problem of planning constructive and administrative engineering with which the municipal engineer must keep in touch if his plans for city development are to function smoothly. Rapid and convenient urban and interurban service depends on the extent to which the system of main traffic streets has been planned to connect the important city centers by the most direct and adequate routes. The vigilance and persistence of the municipal engineer is necessary in securing the proper adjustments of both street and railroad grades and in preventing or avoiding the cutting off or abandonment of important streets in the construction of railroads and yards. In devising plans for getting rid of the grade crossings which are still a menace to life and property and an obstruction to traffic in many of our cities, he is the most important representative of the public.

—"Municipal Engineering," George S. Webster, Trans. Am. Soc. C.E., 1921, page 516.

Asphalt Paving Inspection

By W. Earl Weller
City Engineer, Binghamton, N. Y.

ENGINEERS charged with the responsibility for the construction of public work many times find themselves unable, because of various inroads on their time, to visit the individual jobs as frequently as the work really requires. This means either neglect of the work or the installation of some system of "distant control," as an electrical engineer would term it. Fortunately, a very complete system of such control requires only a small expenditure of time, energy or money; in fact, a well-devised and strictly enforced system of "daily reports" properly used will satisfy all demands.

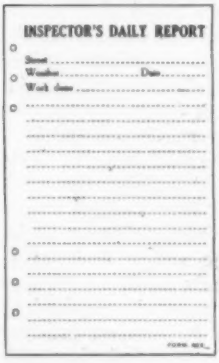


FIG. 1

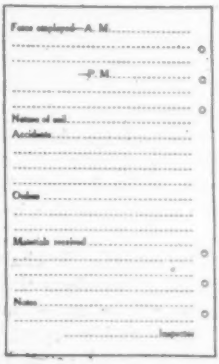


FIG. 2

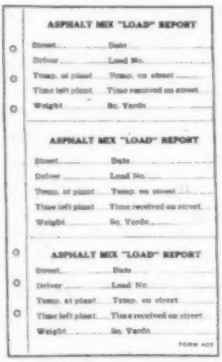

ASPHALT MIX "LOAD" REPORT
Street Date
Driver Load No.
Temp. at plant Temp. on street
Time left plant Time received on street
Weight Sq. Yards
ASPHALT MIX "LOAD" REPORT
ASPHALT MIX "LOAD" REPORT

FIG. 3

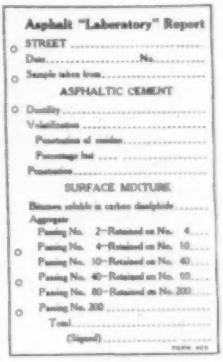


FIG. 4

FORMS USED BY INSPECTORS, BOTH ON THE STREET AND AT THE MIXER, AND THE LABORATORY REPORT FORM

The daily report has long been the ever-present help of engineers occupying executive positions in private corporations, but, unfortunately, the tendency in public work has been to dismiss the report as a useless bit of red tape. In reality, a system of daily reports has three distinct values:

First, the necessity of preparing a daily report that will be read has a decided effect in holding an inspector closer to his job.

Second, when the work is complete, the daily reports form an invaluable record of the job. The profession of contracting has its share of constituent members having such common human failings as inefficiency and dishonesty. Sooner or later every engineer will meet a contractor endowed with one or both of these failings. At such a time the record comes into its own and demonstrates its worth.

Third, daily reports, received and considered not later than the morning of the day following the one covered by the report, keep the engineer in touch with the work each day, no matter how the individual jobs may be scattered, thus making it possible for him to follow the progress of the work, to check the ability of his inspectors and to determine just where the time at his disposal for visiting the work shall be spent. This last is "distant control."

No type of construction work lends itself so readily to such control as the asphalt pavement, and municipal engineers who have spent weary hours either searching for or trying to develop capable asphalt inspectors will add, perhaps, that no type of construction work stands so much in need of such control. The Bureau of Engineering in Binghamton, N. Y., has used for the past three years a system of daily reports in connection with its construction work. These reports have amply proved their value in the light of actual use, and the following brief description of the system as

applied to asphalt construction is offered in the hope that it may be of value to municipal engineers.

Whenever asphalt work is in progress in Binghamton, at least one inspector is on duty at the plant. This inspector is required to file a daily report including certain specific and certain general information regarding the day's run. For instance, he is required to take at hourly intervals the temperature of the asphaltic cement in the melting kettles and to note these temperatures in his report. He also notes on his initial report the mixing formula used by the contractor, and on subsequent reports indicates any change in this formula.

Two other items of specific information must be furnished by the plant inspector on each daily report—the total run of the plant in tons, and a statement of all materials received. He is at liberty, in fact is encouraged, to report any item of general interest in regard to the plant operation, such as the force employed, accidents to employees or to the plant, and general observations concerning operating efficiency. He must report back to the office on his daily report any orders which he may have received during the day. This feature of the report has been especially valuable both in fixing responsibility and in assuring the engineer in charge that his instructions are understood.

All this information is recorded on Form 402 (see Figs. 1 and 2). This report must be filed in the City Engineer's office not later than nine o'clock in the morning of the following day. In addition to the things the plant inspector must do in order to render a satisfactory report, he also takes samples of all materials received and makes such simple plant tests as may be required to keep the mix fairly uniform. At times it has been found advisable to have two inspectors at the plant, one spending all his time on the mixing platform. The samples taken by the inspector include a daily sample of the asphaltic cement taken the first thing each morning from the kettles.

Every load of "mix" leaving the plant must be accompanied by a consecutively numbered load report (see Fig. 3) signed by the plant inspector. These reports are made in triplicate by the inspector, who notes thereon the number, destination, temperature and weight of the load and the time it left the plant. One of these reports is given to the driver of the truck or wagon, the second is given to the plant foreman, and the third is retained by the inspector. When the load arrives on the street, the driver must deliver to the city inspector on the street his copy of the load report. The temperature of the mix is again taken, and if this temperature is satisfactory the load is dumped. The inspector then notes on the copy of the load report given him by the driver the temperature as determined on the street, the time the load was received, and roughly the number of square yards the load was made to cover. The plant inspector sends his copies of the load reports to the office with his daily reports, and the street inspector does the same with the copies that he has received from the drivers.

The street inspector is required to submit a daily report covering the work done, the force employed, and the materials received on the job. The work done must be so described that, should it be necessary, the work of any half-day can be located both on the street and in the plant reports. This result is obtained by describing the work by stations which have been chalked on the curb at regular and frequent intervals by the engineer in charge, and by designating by load numbers the mix used in each section. The street inspector is required to show on his report a fairly close estimate of the yardage of top placed during each half-day and to give, as in the case of the plant inspector, a brief synopsis of any and all orders that he may receive. He is also required to take at least two samples each day of the mixture as received on the street and to indicate very carefully the exact locations in the street and the numbers of the loads from which these samples were taken. The daily reports of the street inspector must be filed in the City Engineer's office not later than nine o'clock of the morning following the day covered by that report.

The samples of the asphaltic cement and of the surface mixture as taken by the inspector are delivered by the engineer in charge of the work to the City Chemist for analysis. These analyses are made immediately and the results reported to the City Engineer on the "Asphalt Laboratory Report" (see Fig. 4).

In the office the load reports from the plant are checked against the load reports

from the street and then destroyed. The load reports from the street are then considered, temperatures being noted first. Any load leaving the plant too hot, or received on the street too cold, is listed for comment. The tonnage for the day is compiled next and checked against the daily report of the inspector at the plant. Any discrepancy calls for an explanation. The tonnage of mix used is then divided by the total yardage reported by the street inspector on his daily report. The result must at least be equal to a previously determined weight per square yard. A discrepancy in this results in a "riot call" for contractor, inspectors and engineer-in-charge and just must be explained or rectified. The recorded temperatures of the asphaltic cement are rapidly considered for any evidence of overheating, and the laboratory reports are checked over as to grading of mix and amount and quality of asphaltic cement. These things can all be done by the secretary if the City Engineer or the Deputy Engineer is busy, and only the variations noted. The remainder of the daily reports are read very carefully and any job that seems to need personal attention is visited during the afternoon.

All of the forms used for the above reports are uniform in size and as simple and convenient as possible. The uniformity of size is applied to specifications, extra work orders and extra work reports, thus making it possible for the inspector to keep all his data and reports between the covers of a single binder. All forms are made 3¾ x 6¾ inches in size—a real pocket size—and are punched for use in ring binders. Field reports are printed on pale blue, and laboratory reports on a light orange paper. When the job is complete, all daily reports, field notes, written orders, extra work reports, construction records and estimates, are bound together in an inexpensive binder and filed away to form the office history of the job. It is surprising how many times these "histories" are needed for reference.

Attention is called to the fact that the system above described is not academic, but rather is eminently practical, and that it has stood the test of three years' exacting use without any serious change in the system or in the forms. It is not to be understood that this system will supply ability that may be lacking in inspectors. No report can possibly tell how well the requirements of the specifications as to handling material or as to raking are carried out. The system will, however, from its very nature tend to increase the inspector's interest in, and application to, his job. It is sometimes objected that such a system requires too much time. This objection may be met with a flat denial. Finally, it must be noted that the ultimate success of the system depends upon the engineer himself. If the reports are dismissed with a careless, cursory glance, at least a third of the value of the system is absolutely wasted.

Reduce the Losses from Impact

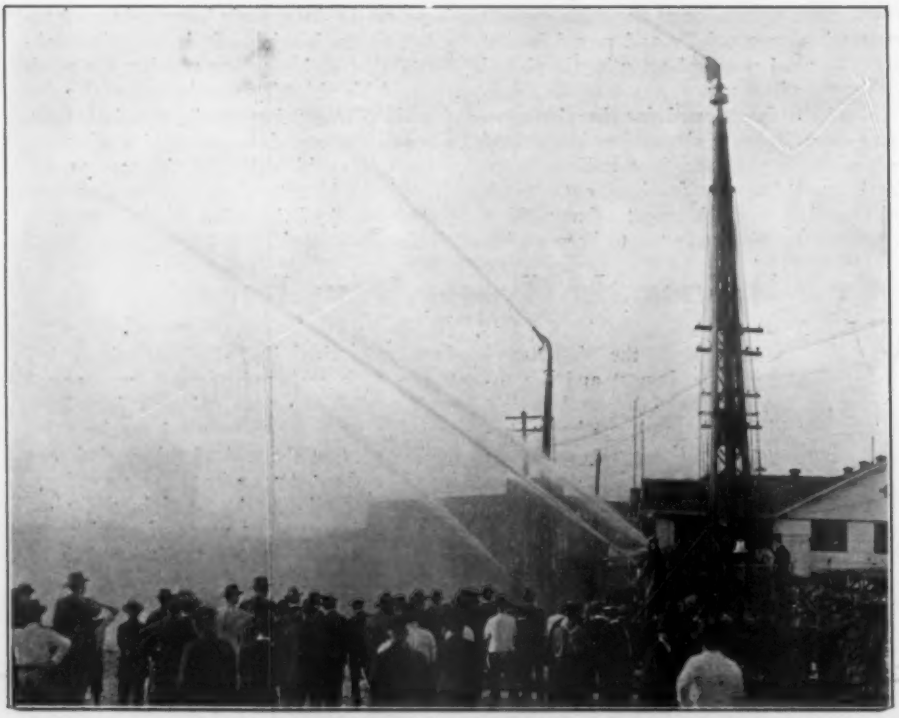
WHAT we have learned in the last few years about the destructive effect of traffic impact and the resistance to impact offered by semi-flexible and flexible highway structures has a peculiar significance in the great economic problem of conserving our investment in old roads, particularly in gravel and macadam roads, when it becomes necessary to adopt a higher type of wearing surface. Prior to the careful investigation of this important subject, there existed a marked and growing tendency to discredit the use of old gravel and macadam roads as foundations for the higher types, in spite of the many remarkable service records of macadam foundations.

For example, in the city of New York, a number of the most heavily traveled streets were constructed years ago on macadam foundations and some are still giving satisfactory service. In 1890, Broadway between 59th and 79th Streets was paved with asphalt over an old macadam base, and for 22 years gave good service. Its replacement at the end of this period was largely due to subway excavations. Seventy-second Street, paved in a similar manner, also gave 22 years of service under increasingly severe traffic conditions, and the same is true for a 19-year period for Fifth Avenue between 110th and 120th Streets. Lenox Avenue between 110th and 124th Streets was surfaced with asphalt over an old macadam in 1904, and is still giving good service. The cost of maintaining this section in 1919, 14 years after construction, was only 1 per cent.

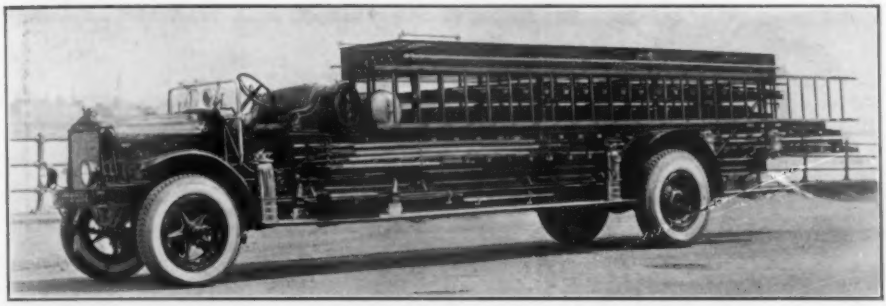
—PREVOST HUBBARD,
Chemical Engineer.

Municipal Departments Motorized for Greater Service

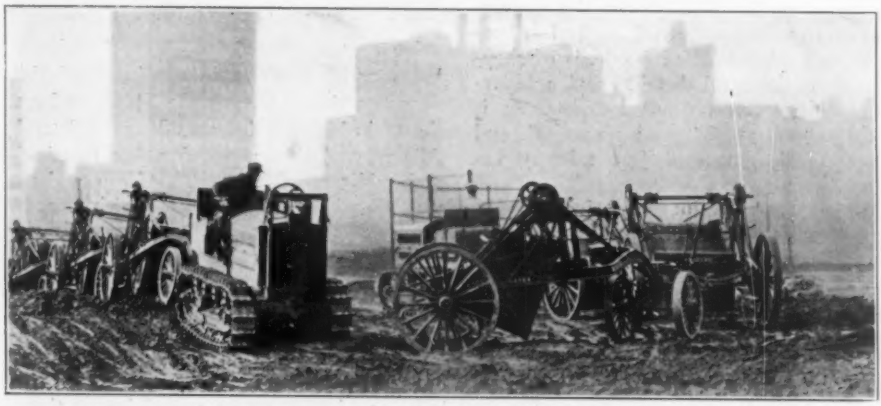
THE BOARD OF PARK COMMISSIONERS, MINNEAPOLIS, MINN., USED THIS BEST TRACK-LAYER TRACTOR AND RUSSELL ELEVATING GRADER IN THE CONSTRUCTION OF VICTORY MEMORIAL DRIVE



TWO 2-INCH STREAMS FROM THE WATER-TOWERS, AND 1¾-INCH STREAMS FROM TURRET PIPES DELIVERED BY AMERICAN-LA FRANCE PUMPERS RECENTLY PURCHASED BY NEW ORLEANS, LA.



A WHITE HOOK AND LADDER IN SERVICE IN EASTHAMPTON, MASS.



TWO HOLT TRACTORS WITH BAKER-MANEY SCRAPERS OWNED BY THE SOUTH PARK COMMISSION, CHICAGO, ILL.

Last fall these outfits began the construction of a new municipal park and bathing beach

THIS "BLACK MARIA" MOUNTED ON A FEDERAL TRUCK BELONGS TO THE BRONX COUNTY, NEW YORK, JAIL

Chamber of Commerce Activities in Public Affairs

Poughkeepsie's Bus Terminal, Comfort Station and Parking Grounds

POUGHKEEPSIE, N. Y.—As the county-seat of Dutchess County, this city has long been the trade mecca of hundreds of shoppers from the rural districts and a favorite stopping-point for automobilists, for it is the largest city between New York and Albany and is located just midway between these cities.

With sixteen bus lines operating between Poughkeepsie and near-by towns, and with approximately two million tourists a year passing through, traffic conditions became a real problem. Because the Chamber of Commerce was vitally interested in solving all problems affecting the city at large, it was called upon to assist in remedying the situation.

Many of the large busses which made regular trips daily to various towns within a radius of 25 miles, received and discharged their passengers on busy street corners or in front of well-known stores. This not only blocked the streets, but prevented other automobilists from stopping in front of the mercantile establishments where they desired to shop. In addition, it was inconvenient for the passengers, as it necessitated their waiting outside on the streets in all kinds of weather.

To overcome these difficulties, the Chamber secured quarters in the heart of the city, two doors from Main Street and on the main highway between New York and Albany, and there opened a bus terminal and public comfort station. An attendant was placed in charge of the waiting-room to give out information, to receive parcels to be delivered to the bus lines, and to check suitcases and bundles. A comfort station was fully equipped with lavatories, 5-cent pay toilets, mirrors, running water, soap and towels. A freight platform was built directly outside of the waiting-room for larger packages, as no parcel larger than a suitcase is allowed in the waiting-room. A large parking lot for the exclusive use of busses was established next to the waiting-room. This lot is fenced in and is under proper protection, and all busses are required to park there when not actually receiving or discharging passengers. No

BUS TERMINAL AND PARKING PLACE ESTABLISHED BY THE CHAMBER OF COMMERCE, POUGHKEEPSIE, N. Y.

bus is allowed to park in front of the waiting-room until ten minutes before the scheduled starting-time. This convenience was taken advantage of by every bus driver, but in order to eliminate any possible return to the old street-corner parking, an ordinance was passed by the Common Council restricting the parking of cars. Bus drivers and patrons alike are enthusiastic in their praise of the conveniences thus afforded them by the Chamber of Commerce.

Another difficulty experienced was caused by the ever-increasing number of pleasure cars parked along the main thoroughfares and side streets. Some of these cars were parked for hours at a time while people were shopping or keeping other appointments. In order to relieve the streets of this crowded condition, the Chamber secured a vacant lot directly across from the bus parking ground and waiting-room. The Board of Public Works cooperated by having the space cleared, covered with ashes and rolled, and the Chamber secured an attendant to properly guard the cars parked there. Cars are checked as they enter, and the owner is given a corresponding number for identification. No charge is made for this service, but the attendant has the privilege of accepting gratuities.

With provision made for the proper parking of busses and pleasure-cars, facilities for the handling of freight and small packages, a waiting-room conveniently located, a comfort station modern and well-equipped, attendants courteous and always ready to give desired information, Poughkeepsie's welcome leaves a lasting impression that the city's interest in her visitors extends far beyond that of dollars and cents. Each visitor as he leaves for his home town has a satisfied feeling that in turn redounds to the benefit of the city in its industrial, mercantile and financial growth.

RALPH W. BUDD,
Secretary, Poughkeepsie Chamber of Commerce.

Fifth Annual Planting Day Celebrated

PROVIDENCE, R. I.—The Fifth Annual Planting Day conducted by the Providence Chamber of Commerce was successfully held Saturday, April 22. The exact number of plants actually sold under the auspices of the Chamber of Commerce and paid for by pupils in public schools and factory operatives was 31,114. The plants ordered in 1922 were as follows: Dorothy Perkins climbing rose-bushes, 13,122; Deutzia, 4,365; syringa, 5,167; Clematis, 3,290; weigela, 5,170. It is estimated that, in addition to the plants ordered through the Chamber of Commerce, 50,000 plants were placed in the ground at the homes of the many thousands of residents of the Providence-Pawtucket-Cranston-Central Falls-East Providence community as a result of the stimulus of the campaign conducted by the Civic Affairs Committee of the Providence Chamber. In evidence of this large demand, reports from various nurserymen might be cited, one of them being an order from a manufacturing establishment for over 4,000 plants.

All the previous planting-day campaigns conducted by the Chamber have been successful, and in each case the receipts have just about covered the expenses. Planting-day proclamations, in response to the request of the Chamber, were made and published by the mayors of Providence, Pawtucket, Cranston and Central Falls, and by the President of the Town Council of East Providence. A general circular was issued by the committee, and two sets of order blanks were printed, in different colors, one for individuals and one for schools, factories, etc. No individual orders were accepted by the Providence Chamber of Commerce, all such orders being required to go through the public school or factory channels, through which the delivery of plants was likewise made. In addition to the printed material mentioned above, the Chamber issued, with the cooperation of the Rhode Island State Board of Agriculture, a descriptive circular on how to plant shrubs.

Once in a while there have been reports of shrubs which failed to grow, but such reports have been so few as to count for nothing in comparison with the great favor with which the plan has been received each spring. We believe that chambers of commerce all over the country can with profit undertake such campaigns, for the cost is trifling and the pleasure derived therefrom is great and permanent. Beautifying the city with plants is not only good citizenship but good business.

CLARENCE A. COTTON,
Ex-Secretary, Chamber of Commerce.

Thirty-Six Feet of Injuries

LOS ANGELES, CALIF.—Just what does "thirty-six feet of injuries" mean? Briefly, this: It means physical pain and suffering. It means a serious economic loss. It means that erstwhile happy homes are suddenly overshadowed by death. It means in many cases that someone has failed in his moral duty to so govern his actions that he may not jeopardize the happiness or lives of his fellow men. And it means that innocent dependents are suffering mental pain and actual physical distress.

The Los Angeles Chamber of Commerce, through its Department of Safety and Fire Prevention, is putting forth every endeavor which will tend to reduce injuries. Note the reference to "injuries" rather than to "accidents"; this for the reason that it is not believed, notwithstanding the age-old adage, "Accidents will happen," that the word "accident" can be properly applied in this connection. Webster says under "accident"—"an event which is unexpected," or "the cause of which was unforeseen." Is the cause "unforeseen" when one operates a car without proper brakes or without adequate anti-skid devices when driving on wet pavements, or when one drives at a speed not consistent with safety? Is the cause "unforeseen" when one operates a machine in an industrial establishment without such machine's being properly guarded, or when one has failed to observe the safety precautions inaugurated for his protection? The consequences of such are not properly called "accidents." Therefore, the statement is repeated that our efforts are directed towards the reduction of "injuries."

This is being done through lectures given in the Chamber of Commerce auditorium and elsewhere, and through personal talks to workmen in industrial plants. Bulletin boards are supplied to such plants as well as to garages and gasoline stations, and bulletins, also supplied by the Chamber of Commerce, are posted on the boards at frequent intervals. Safety committees are organized in industrial plants. Lessons on safety are supplied to superintendents and foremen of such plants. Safety lessons for automobile drivers are furnished to all who are interested. Personal inspections are made of business houses, industrial plants, garages, etc., with a view to the elimination of any existing fire or accident hazards. Cards, leaflets and booklets giving safety hints, traffic rules, etc., are distributed by mail, through information

THIRTY-SIX FEET OF NEWSPAPER CLIPPINGS RECORDING ACCIDENTS IN LOS ANGELES

bureaus, and through the management of industrial plants, business houses, schools and clubs.

In fact, every possible channel which will serve in the dissemination of a safety thought or action is brought into use. From the results thus far attained, as evidenced by reports from those whom we have been privileged to serve, the effort has proved worth while, and we are certain that the cumulative effect will mean a continued improvement; but a glance at the daily papers brings to us a realization of the fact that there is still a tremendous amount of work to be done in the field of safety, that we may not suffer the consequences of our own or another's carelessness.

JOHN D. MAXFIELD,
Manager, Department of Safety and Fire Prevention, Los Angeles Chamber of Commerce.

Chamber Secures Reduction in Building Costs

TRINIDAD, COLO.—Substantial reductions in building material prices, as well as in the wages demanded by carpenters, plumbers and steamfitters, and electricians were recently secured for Trinidad by the effective work of the Board of Directors of the Trinidad-Las Animas County Chamber of Commerce. The Board made a thorough investigation of Trinidad building costs as compared with material and labor costs in other Colorado cities, and held a series of conferences with the various groups concerned. A spirit of frank open-mindedness characterized these conferences, and a sincere effort was made to arrive at a basis that would be fair to all parties. The findings and results of the investigations were made public through the local press, which gave excellent support at all stages.

Simultaneously with the publication of the final report of the Board of Directors, the Chamber of Commerce announced in post-card form the following creditable list of improvements and construction activities under way:

$150,000—High School gymnasium and auditorium
$200,000—New residences
$522,000—Street paving contracts
$100,000—Gas company improvements
$85,000—New Catholic school
$50,000—New Christian church
$60,000—City of Trinidad

Are we not entitled to be mussed up a bit? Trinidad apologizes for her appearance now, but please come back soon and see our new city.

WILLIAM E. INGLIS,
Secretary, Trinidad-Las Animas County Chamber of Commerce.

Finding Out Where Candidates Stand

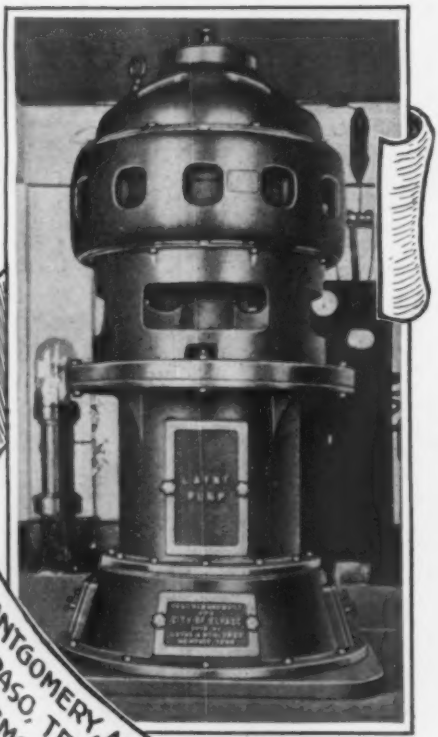
PITTSBURGH, PA.—For some years it has been the custom of the Allied Boards of Trade of Allegheny County, Pa., to send a questionnaire to all the candidates for local offices, such as mayor, council, etc., as well as to candidates for the Legislature. These questionnaires contain epitomes of the various progressive measures which are desired and which are being promoted by the local civic bodies holding membership in the Allied Boards of Trade. It is an effective method of bringing these matters before the prospective mayor, councilmen, legislators, etc., at the proper time, from a psychological standpoint, to secure their most favorable consideration. Of course, the "standpatter" and reactionary candidates do not respond, but the progressive, civic-minded candidates are glad of such an opportunity to express themselves and to secure the publicity which is given to their replies.

At the recent primaries held on May 16, fifty-two candidates for the State Senate and the House of Representatives replied to the questions sent out by our committee. The questionnaire contained a number of home rule amendments to the present laws; it asked for support for the Pittsburgh Graded Tax Law, by which buildings in Pittsburgh are now assessed 60 per cent of the amount assessed on the land, and the extension of this law so as to exempt all buildings from taxation; the city manager plan and election of council by proportional representation; certain election reforms, including the adoption of voting machines; and one assessing board for city and county. The replies were published in the daily papers and printed in the monthly report which is distributed through the various civic bodies.

The election of the members of the Legislature has been heretofore largely under the control of the machine politicians, but this year quite a number of the candidates elected are favorable to the program of the Allied Boards of Trade.

J. RALPH PARK,
Executive Secretary, Allied Boards of Trade of Allegheny County, Pa.

A DEEP WELL PUMP



AND A FEW OF ITS USERS

SIZES

Layne Turbine Pumps, built in sizes to deliver from 200 to 5,000 gallons per minute, are installed directly in wells, compartments or shafts, ten inches in diameter and larger.

LIFT

Layne Turbine Pumps lift water from 10 feet to 1,000 feet in depth, delivering it to elevated tanks or to pipe lines under pressure.

WORKING PARTS

There are only two mechanical working parts, the drive shaft to which the impellers are attached and the thrust bearing in the head, from which the operating shaft is supported. Both parts operate in a bath of oil. Perfect alignment is insured through suspension of the rotating shaft from the top on a self-aligning bearing. The entire pump hangs from the surface of the ground, with no bracing or struts required below the surface.

MAINTENANCE

There is one permanent adjustment which is made at the time of installation. It is not necessary to adjust the pump thereafter. It is practically noiseless in operation with automatic lubrication and only one simple packing gland which is located above ground. There are no valves to look after and it is not necessary to prime the pump.

Literature will be sent to municipal officials and others interested free on request.

MONTGOMERY, ALABAMA
EL PASO, TEXAS
PORTSMOUTH, N.H.
JAMAICA, L.I.

SAVANNAH, GEORGIA
CHICAGO HEIGHTS, ILLINOIS
PENSACOLA, FLORIDA
GALVESTON, TEXAS

LAYNE & BOWLER CO.
MEMPHIS, TENN.

Overhauling the School System

SAN FRANCISCO, CALIF.—Several years ago the public school situation in San Francisco was a subject of serious criticism on the part of various groups, including the Municipal Affairs Committee of the Chamber of Commerce, and the Collegiate Alumnae Association of California. In view of these criticisms, the Chamber of Commerce was instrumental in bringing together a few representative groups of men and women interested in education, including leaders in commercial organizations, labor unions and women's clubs.

This group made a hasty study of the local situation and determined that it would be advisable to have a survey made by a recognized and competent outside authority, and we undertook to secure the services of some national body. We subsequently sent the Vice-President and General Manager of the Chamber east, with the result that after conferences with several organizations and individuals the United States Department of Education agreed to make such a survey if invited to do so by the San Francisco Board of Education.

In cooperation with the others interested, we then took the matter up with our Board of Education, and after satisfying it that there was no feeling of criticism, and that the sole interest was to secure from the best possible sources a complete study of our school department and the system under which it operates, and recommendations for the betterment of our educational system, the Board formally invited the Department to make the study.

The San Francisco Educational Society was then organized, consisting of the original groups and some additional men and women. A fund of $8,500 to cover the cost of the survey was raised and deposited with the Chamber of Commerce as Trustee and was used to cover the costs of the study.

The actual survey was made under the personal direction of Philander P. Claxton, Commissioner, Bureau of Education of the United States, and was most comprehensive. Each of the experts working under Dr. Claxton studied his particular problem as it existed in the local school system and submitted the results of the survey together with the recommendations for the correction of existing evils.

The results of the entire survey proved conclusively that the public school system in San Francisco was wrong basically. The difficulty lay in the very heart of the system—in the Administrative Board. The city charter at that time provided that the people elect every four years a Superintendent of Schools, who was under the control of the Board of Education, composed of five members, four appointed by the Mayor and the County Superintendent of Schools; the latter was ex-officio a member of the city Board on an equal footing with the appointed members. The Board was divided into committees, each having the right to take the initiative and make recommendations for immediate action on questions not previously considered. To all their rulings, the Superintendent was subordinate. The Board members received a yearly retaining fee of $3,000 each and gave all their time to the schools. They were virtually the body of technical experts for the performance of duties which in other cities were assigned to the superintendent of schools and his assistants.

The recommendations of the United States Bureau of Education called for a definite reversal of this system of authority. It recommended the amendment of the city charter in such a way as to provide for the creation of a Board of Education which should serve without pay; be independent of all other branches of city government; have power to appoint a Superintendent of Schools and to confirm or reject the Superintendent's nominations of all deputy or assistant superintendents, directors of special departments, supervisors, principals, teachers and such other officers and employees as may be provided by the charter or by action of the Board; and which should have full control and management, through its Superintendent of Schools and his assistants, of all matters relating to the public school affairs of the city, whether in the educational, the business, or the financial departments of the school system.

This recommendation has been very closely followed in the revision of the San Francisco schools system. The present system calls for a Board of Education composed of seven members, for whose combined compensation $5,000 annually is provided. This Board appoints the Superin-

Health Hints for Public Places

The Commissioner of Health in every community knows the necessity of safeguarding the public health in every possible way. He knows the value of modern sanitary appliances, such as

Mueller Sanitary Drinking Fountains

Artistically designed, upon correct scientific principles, these Sanitary Fountains are ruggedly built and require practically no attention after installation.

No. E-3650, patented, Double Head Pedestal is one of several attractive *MUELLER* Fountains, descriptions and prices of which will be sent on request.

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tendent of Schools and approves the appointment of his assistants. The Board is divided into five standing committees: Finance, Supply, Building, Text, Personnel.

The position of the Board of Education is that of a board of directors in a corporation, and the Superintendent and his assistants act as a staff of technical experts executing and managing the system and being responsible to the Board of Education.

The present plan has been effective in creating straight-line authority which has assisted greatly in the work and has improved the spirit of the entire department.

Another recommendation embraced the redivision of grades among the grammar, intermediate and high schools. This recommendation was modified to include a 6-3-3 plan whereby the grade school contained 6 grades; the Junior High School, 3 grades, and the High School, 3 grades.

Following the suggestion of the survey, classes in sight saving and Americanization, evening schools, extension courses, day schools for adults, vocational, juvenile court and parental schools have been started. The survey recommended consolidation of all school activities of the Board of Health and of the Playground Commission under the Board of Education. This plan has not been entirely carried out, because it was considered inadvisable to do away with the Playground Commission altogether. Measures of a health corrective nature in the schools, however, are instituted only by the Board of Education, with serious consideration of recommendations of the Board of Health. This cooperative plan has proved very satisfactory. A group plan is now under consideration for the creation of a group in which special coaching teachers will be provided for the backward children who are retarding their fellows.

The survey also recommended that the charter be amended to give the Board of Education entire control and management of its building affairs. At present the Board of Education formulates and provides all building policies, but these are executed by the Board of Public Works. No serious evil is found in this combination.

The Board makes its own budget, but does not determine the amount of tax levy for this expense, as was recommended by the Bureau of Education. Plans are now under way for the creation of a new office carrying the title of Business Manager, or similar name, which will have charge of the auditing and accounting.

The survey recommended five deputy superintendents. Six are now elected each year by the Board. The entire teaching staff is chosen only on the recommendation of the Superintendent. The offices of janitor and mechanical servants are subject to the civil service regulations. The Board holds meetings twice a month on the first and third Tuesdays. On the second and fourth Tuesdays a conference of the Board is also held. The minutes of the meetings are not printed, as suggested, on account of a lack of money. The Board of Education hears the case of any dismissed member of the staff and is the final tribunal. A system of efficiency ratings has been formulated to keep a closer check upon the staff.

The Board of Education, the Chamber of Commerce, and other civic organizations feel that a very great improvement has been made by the formulation and adoption of the recommendations of the Bureau of Education.

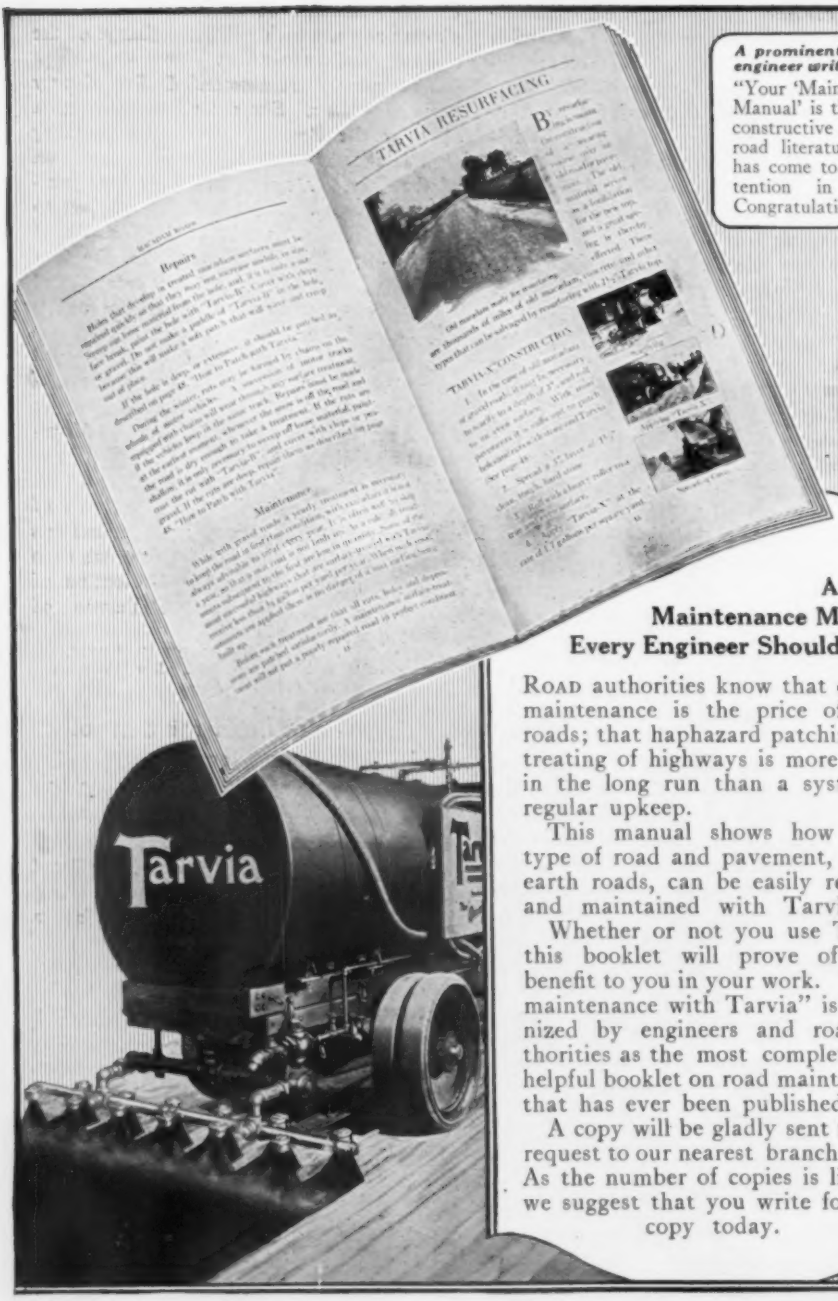
A. DE WITLOOK,
Director, Research Department, San Francisco Chamber of Commerce.

Clean-up Prizes for School Children

BURLINGTON, N. J.—The aid of the school children was enlisted in the educational campaign which preceded Burlington's Clean-up Week. The Chamber offered prizes to the school child writing the best essay on "Why Burlington Should Have a Clean-up Week Campaign," and the child designing the best poster for such a campaign. The week began with a parade of the school children on Monday at noon. A prize was offered to the class presenting the most comprehensive example of a clean-up campaign. Nineteen classes competed and showed such interest that a prize was awarded to each class. The Scouts were also enlisted. The city was divided into seven districts, each in charge of a troop of Boy Scouts, and a prize was given to the troop having the cleanest district at the end of the week. Splendid cooperation was secured from the daily newspaper, which carried a front-page double-column head every day of the week.

P. J. PERINCHIEF,
Secretary, Chamber of Commerce.

A prominent engineer writes:
"Your 'Maintenance Manual' is the most constructive piece of road literature that has come to my attention in years. Congratulations."



A Road Maintenance Manual Every Engineer Should Have

ROAD authorities know that eternal maintenance is the price of good roads; that haphazard patching and treating of highways is more costly in the long run than a system of regular upkeep.

This manual shows how every type of road and pavement, except earth roads, can be easily repaired and maintained with Tarvia.

Whether or not you use Tarvia, this booklet will prove of great benefit to you in your work. "Road maintenance with Tarvia" is recognized by engineers and road authorities as the most complete and helpful booklet on road maintenance that has ever been published.

A copy will be gladly sent free on request to our nearest branch office. As the number of copies is limited, we suggest that you write for your copy today.

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Improving the Municipal Light and Power Plant of Brookings, South Dakota

This Town of 4,000 Operates Its Own Electric Light, Power, Heat, Water and Telephone Systems

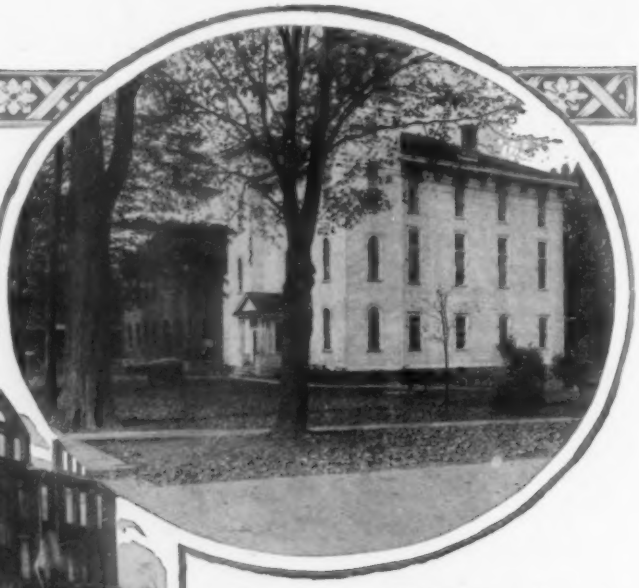
By W. F. Schaphorst, M. E.

THE city of Brookings, S. Dak., located close to the Minnesota and South Dakota border line, midway between the northern and southern extremities of the state, has a population of only 3,924 according to the 1920 census. During 1919 and 1920, when prices were at their maximum, the city laid nearly five miles of concrete paving at a cost of approximately a half-million dollars. A $400,000 school building was also erected. Early in 1921, a special election was called to vote a bond issue of $60,000 for the improvement of the municipal power plant, which had become inadequate and was continually overloaded. The plant had failed to keep step with the growth of the city and the demand for more light and heat for business and domestic purposes.

Despite the fact that prices on power-plant machinery had not dropped to any considerable extent, the bond issue was approved. In announcing the bond issue it was made plain that a large part of the wastage of coal at the plant was due to worn-out boilers, overloaded engines and out-of-date equipment. Figures were shown to demonstrate that the new equipment would pay for itself in a very short time and that lower rates for light, heat and power could be made possible by installing new machinery which would increase the efficiency of the entire power plant.

EXTERIOR OF THE BROOKINGS, S. DAK., MUNICIPAL POWER PLANT

The power plant, prior to its rehabilitation, consisted of one 150-kilowatt generating unit driven by a Corliss engine at a speed of 100 r. p. m. This unit has been running constantly for 21 years and is still used occasionally. Eight years ago a 200-kilowatt direct-connected unit was installed, which is driven by a four-valve non-re-



Three story wood school building at Arcade, N. Y. Heated by waste steam from the town's electric light plant.

The daily press tells us repeatedly of hazardous school fires from forced heating systems.

Remove All Fires from School Buildings—Use Community Heating

Ask for Bulletin No. 20-AC on "Adsco Community Heating," Bulletin No. 158-AC describes "Adsco Heating," the One Valve System, for individual buildings. Name of your architect appreciated. Architects, engineers, and heating dealers also write for Bulletin No. 159-AC.

Adsco Graduated Radiator Valve gives positive control.

THIS school building had six separate furnace fires in the basement and the top floor could not be occupied due to existing fire hazards.

Now there are no fires in the building and the top floor is safely used. Heat is supplied by exhaust steam piped through an underground main from the municipal power and lighting plant. The old radiation and piping were used.

Steam, easily regulated as required, is now charged for by meter in same way as gas or water.

This is but one instance where a school house was made safe. During the past forty years we have designed and installed Adsco Community Heating Systems in more than 400 towns, institutions, industrial plants, groups of residences, also groups of city office buildings. Steam for heating is supplied from Central Station Plants, either new or old, and is piped to the various buildings through underground mains. The success of these systems has been largely dependent on the specialties and insulations we have perfected to prevent leakage and waste.

Write for complete information regarding cost, operation and profits of Adsco Community Heating.

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ADSCO HEATING

leasing Corliss engine at a speed of 200 r. p. m. Four fire-tube boilers constituted the equipment of the boiler room.

A well-qualified consulting engineer made an examination of the chimney, which had been declared in very poor condition, and stated that with a few metal bands it could be made safe and sound and that it was amply large to meet the demands, not only of the present plant, but of the plant as enlarged. He found that a new unit could be installed, with other more efficient equipment to bring the capacity of the plant high enough to take care of the needs of the city for many years, for approximately $60,000. He criticized the plant with the remark that it was conspicuous for its lack of measuring equipment with which to ascertain just what the plant was doing, wherein it was wasteful, or in what way it was efficient.

Boiler-Room Facts

In the boiler room, two of the four fire tube boilers have been removed and a 500-horse-power Stirling water tube boiler installed. While the Stirling boiler was being installed it was impossible to operate continuously with the two remaining boilers, which had to be shut down every Sunday afternoon in order to give them a thorough washing out.

An interesting, though not uncommon, misunderstanding regarding the elimination of smoke was well demonstrated in Brookings. Many laymen and newspapers often speak of "a smoke-consuming device" as though it were a machine. There is no such thing as a smoke-consuming machine. The best way to prevent smoke is to properly construct the furnace and admit air in the correct places and in the correct amounts. In the Brookings plant an inferior grade of fuel is used under the boiler. This fuel is Franklin County, Ill., screenings, 1½-inch size. The intermingling air under such conditions must be sufficiently heated so that it will ignite the volatile gases and unite with them. To do this properly, ample space and ample time for complete combustion are required. Unless the temperature is high enough and the volume and time element ample, the gases will strike the comparatively cold boiler-heating surfaces, will cool off, and will pass up the chimney without burning.

To insure complete combustion, fire brick arches are now commonly used with good results, and are particularly valuable where bituminous and low-grade volatile coals are used. With a good fire brick arch, it is possible to heat the air to a higher temperature than without the arch.

The selection of a good fire brick arch for use in the Brookings plant should have been given serious thought, because unless the layers of fire brick are thick enough, or there are a sufficient number of layers of brick, it is necessary to replace the arch very frequently. An arch was installed, but it was of the circular type rather than of the flat type. The circular arch is cheaper but less effective. By using a double suspension arch, a reserve arch or emergency arch is obtained; this permits using up one hundred per cent of the main arch next to the fire and a considerable portion of the reserve arch until it is convenient to shut down for repairs. The reserve arch also acts as an insulator to the framework, securely protecting it from the intense heat. Crystallizing or sagging of the supporting iron work does not occur under proper conditions. The Liptak Fire Brick Arch Company, of Minneapolis, Minn., which specializes in fire brick arches and in fire brick work in general, supplied the arch and did the bricking-in for the Brookings plant.

The new direct-connected Corliss engine, operating at 150 r. p. m., was purchased from the Murray Iron Works, Burlington, Iowa. This engine now drives a 500-kilowatt General Electric generator. The new unit has been installed so that it can be operated in parallel with the old and gives the plant a capacity of 800 kilowatts when running at full capacity, in place of the former 280 kilowatts. Throughout the plant provision has been made wherever possible for additional units or equipment to be added as increase in the capacity may require. The boiler feed water is softened by the Refinite method.

The cost of coal per ton last winter rose to $9 delivered to the power station. This cost could be considerably reduced by building a side track from the railroad about two blocks distant or by installing a coal conveyor system. Such a siding or conveyor system should pay for itself in a short time by reducing coal-handling costs. The plant uses from 13 to 25 tons of coal per day. In feeding coal to the boilers, it must first be shoveled into the stoker hop-

There Is No Substitute for "Caterpillar"* Construction

The "Caterpillar's" field of usefulness is by no means limited to road making. There is a Caterpillar"* of size and capacity for every power need. On farm or ranch, in the mining, oil and lumber industries, for snow removal and other civic work—wherever power and endurance are at a premium, the "Caterpillar"* has no real competitor.*

Just as Holt has pioneered in the invention and practical application of the features of construction which give the "Caterpillar"* its unmistakable leadership, so Holt has pioneered in their perfection. Our engineers, through constant study of the road-maker's needs have made the "Caterpillar"* unrivaled for ease of control, dependability of performance and low cost of upkeep. On road-making and hauling projects of every kind "Caterpillars"* will be found doing the work *better and cheaper* than any other method or machine. On request we will arrange to show you motion pictures of "Caterpillars"* in action on jobs like yours, or send our new booklet, "Caterpillar Performance."

** There is but one "Caterpillar"—Holt builds it. The name was originated by this Company, and is our exclusive trade-mark registered in the U. S. Patent Office and in practically every country of the world.*

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pers. It is intended, later on, to construct storage bunkers overhead, from which coal will be fed by gravity in the ordinary manner. A type "E" double retort underfeed stoker has been installed and works very well with the Stirling boiler.

A Clarage fan is used, driven by a belted vertical 300 r. p. m. Troy engine for mechanical draft. Similar combinations are frequently used where a poor grade of coal is burned, requiring a comparatively high air pressure. This probably could have been improved upon by the installation of a screw blade propeller blower delivering air parallel to the shaft's axis. The stoker, forced draft fan and damper are controlled by means of a damper regulator. Mechanical regulation of this sort is almost invariably superior to manual regulation.

Selling Electric Power

The city of Brookings is furnishing light and power within its corporate limits and is extending its distribution lines to a number of smaller towns in South Dakota. A contract has already been signed with Volga, to receive 24-hour service from the Brookings plant for a period of five years. The current is delivered to the city limits, where Volga takes it over the city's own transmission lines and distributes it to consumers. The current is sold to Volga at the flat wholesale rate of 7 cents per kilowatt hour at the Brookings switchboard.

The Municipal Heating System

Exhaust steam from the engine has been used for a number of years for heating business buildings on Main Street, for heating the municipally owned buildings, such as the city hall and school buildings, the public library, and the new school building which was in process of erection when this was written.

Until a short time ago steam condensate meters had not been installed, heat having always been furnished on a flat wall area basis. This method was a thorn in the flesh of many of the Brookings people, who believed that the city was losing money because of its loose methods. It is true that some users of city heat were unnecessarily careless in leaving windows open during cold weather. Meters have corrected that evil. Sometimes, during extremely cold weather when the thermometer occasionally drops to 40 below zero, live steam is furnished for heating, which is permissible provided it is practiced only during very cold weather. Some of the taxpayers of Brookings have protested against the use of live steam in the heating mains, but it is easy to show that such protests are in error, as long as the use of live steam is not overdone.

The Municipal Water-Supply

For the municipal water-supply a well was dug about 20 years ago, 1¼ miles west of Brookings, and a small cover built over it. An internal combustion engine was first used for pumping, but this was later replaced by a 20-horse-power electric motor. The water is pumped into a 100,000-gallon tank located on an elevation in East Brookings. The water pressure throughout the city averages about 70 pounds per square inch. During 1920 the water department operated at a loss of $565.87. There are about 900 water consumers in the city. Water is charged for at the rate of 25 cents per thousand gallons. A minimum charge of 75 cents per month is made, permitting the user to have 24,000 gallons per year. If more than that amount is used, he pays for it at the standard rate of 25 cents per 1,000 gallons.

The Telephone System

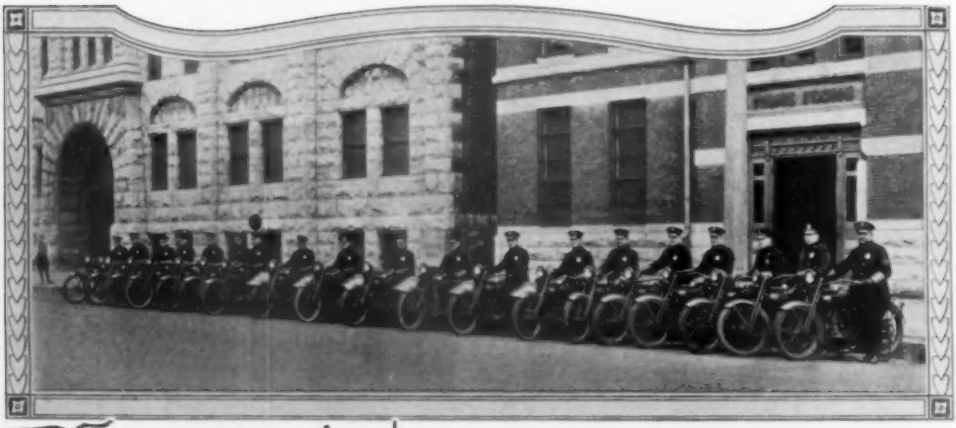
The city of Brookings is almost unique in operating its own telephone system. It is actually making money at the following rates, which are for unlimited service. There are over 1,000 telephones in the city.

MONTHLY RATES IN ADVANCE FOR TELEPHONE SERVICE WITHIN CITY LIMITS

Business use	$2.50
Extension	1.00
Two-party, selective ringing, each	2.00
Two-party, same phone, each	1.75
Residence, single line	1.50
Four-party, selective, each	1.00
Extension, each	.50
Extension, bell, each	.25
Desk phone, extra	.25

Reduction in Rates

Only recently, rates for electric current and for heat have been reduced. The old rates for lighting were 15 cents per kilowatt for the first 100 kilowatts and 12½ cents per kilowatt thereafter. This has been reduced to 12½ cents for the first 100 and 10 cents for each kilowatt thereafter. The old power rate was 10 cents and 6 cents on the basis of 100 kilowatts and over. This has been reduced to 8 cents and 5½ cents. The rate for steam heat has been reduced from $1.10 per 1,000 pounds of condensate to $1.



36 Speeders, Bag of New Traffic Bureau

Police Court Fines Aggregate $1,042 in Record Sunday Catch; Patrolman Otzelberger Gets 12 Unaided

...ts Receive ...t—$10 Bill

...present Monday ...e a clipping from ...t about the trip ...ad been out of ...onths, was re... ...note signed, "A ...e note read: ...ortal. Please ...ay handed to ...

...few days ...children ...has not ...ing hard

...W ...ool ...d of ...Val...

The inauguration of the traffic bureau of the police department Monday was accompanied by the largest catch of speeders yet brought into Milwaukee courts on a Monday morning, 36 defendants paying to the clerk of the court $1,042.76.

Of the 36, one was charged with reckless driving, after an ineffectual attempt to get away from the motorcycle policeman. Another was a motorcycle speeder. The remainder were autoists who obeyed that impulse, to "step on 'er."

He Bagged One-third

Motorcycle Policeman Leo Otzelberger won honorable mention by capturing 12 of the 36 speeders on two of Milwaukee's thoroughfares, Oklahoma-av and Lincoln-av, which provide the motorist with the best straight-away speedway in the city.

Added to the large number brought in by Otzelberger, he has to his credit the feat of capturing two speeders at once. The "double play" was worked this way: Otzelberger had timed John Weltzer, 709 Sixty-third-av, and Martin Jastrowski, 1036 Weil-st, between Eleventh and Fifteenth-ave on Lincoln-av and found them moving at 36 miles an hour.

It Cost $35 Extra

Otzelberger sped ahead and while ...crowding Weltzer to the curb Jastrowski started to edge past. The ... ...an hailed him and made him ... ...by, to be performed the ... ...which [illegible]

Ask your local dealer for free demonstration of the Harley-Davidson. Or write us for special, illustrated literature which shows how several cities—large and small—use "America's Police Motorcycle." No obligation to you.

A Good Day's Work

NOT bad for one Sunday's work—36 arrests for speeding and reckless driving—$1,042.00 in fines paid to the city of Milwaukee!

Milwaukee's police department and citizens swear by the Harley-Davidson. And crooks and law breakers give the city a wide berth. Mounted officers—riding regular "beats" all over the city—have given Milwaukee the reputation of being one of the most orderly cities in the country.

Over 900 cities and counties now use Harley-Davidsons for police work. They have all found that a motorcycle soon pays for itself, and thereafter earns the city a good profit for years. The low upkeep (average, 50 miles for a dollar—gas, oil, tires and all) and the wonderful durability of the Harley-Davidson are features that appeal particularly to city officials and taxpayers.

HARLEY-DAVIDSON MOTOR CO.
MILWAUKEE, WISCONSIN

Harley-Davidson
World's Champion Motorcycle

Municipal Finance

BONDING **ACCOUNTING** **TAXATION**

Seattle Takes Exception to Census Bureau Data

To the Editor of The American City:

In your issue for April, 1922, you have an article entitled, "Is Your City Living Within Its Income?" The table accompanying this article is said to be taken from statistics furnished by the Census Bureau.

In glancing over this table I notice that the per capita cost for my own city is very much greater than that for any other city on the list. This amount is given as $107.72. Multiplying this by our population would give a total expenditure of more than thirty-two million dollars per year. I have endeavored to analyze these figures in order to ascertain how such a huge total for a city of our size can possibly be arrived at. It is not shown in the statement whether or not these figures include taxes paid for county, state and school, as well as strictly municipal, expenses. However, for Seattle the figures are as follows:

For municipal purposes..	$6,320,000.00	
Per capita		$19.80
For schools	5,640,000.00	
Per capita		17.90
For state	1,500,000.00	
Per capita		4.70
For county	1,760,000.00	
Per capita		5.60
For Port of Seattle	250,000.00	
Per capita		0.80
Total	$15,470,000.00	$48.80

The above are amounts paid by taxation. The city of Seattle owns its own water system, light and power system, and street railway system. The cost of operating these three utilities—all of which cost is met by revenues derived therefrom—is $12,000,000, or $38 per capita.

There was also spent last year by the city for local improvements, the cost of which is paid by special assessments upon property benefited, $2,500,000, on the enlargement of the light and power system $2,000,000, and for construction of school buildings approximately $1,500,000, or a total of $6,000,000. If this were figured as a per capita charge, the amount would be $19.80. If all these figures be added together it makes a total of $105.80 per capita, which agrees substantially with the figures shown.

In other words, in figuring the expenses of the city, the statistics evidently take into account money spent for capital expenditures and the money spent for the operation of self-supporting utilities, as well as the money raised by direct taxation. It certainly needs no argument that money spent on capital account should not be included in these figures, for the reason that they all include amounts set aside annually for redemption of bonds. Nor should money spent for the operation of public utilities be included, for the reason that some cities own and operate none at all, while others have a considerable investment of this character. If this be the method used in the computation of statistics shown in these tables, they are certainly utterly worthless. To make arbitrary classifications, as has apparently been done in this case, leads only to confusion and not to enlightenment.

The city of Seattle has lived within its income for many years and does not issue bonds to meet deficits in current funds. If there happens to be a deficit in the annual expense account, this deficit is included in the tax levy for the succeeding year.

I have been endeavoring for some time to ascertain the comparative expenditures of cities, but have found the problem a very difficult one owing to the very diverse methods of taxation and of accounting. The Census Bureau would confer a very great benefit if, instead of circulating figures which lead to grossly incorrect comparisons, it would analyze the cost of city government and present the results in such a way that intelligent conclusions might be derived therefrom.

A. H. DIMMOCK,
City Engineer.

Seattle, Wash.,
May 25, 1922.

King Quality Wins

Another Big Order. Thirty Five Carloads King White Way Materials For One Customer.

This picture shows the 30th carload leaving our plant.

We are Street Lighting Specialists. Our many years experience is available to you Consult our Engineering Department

KING MANUFACTURING CO.

MONADNOCK BUILDING CHICAGO ILLINOIS

The City's Legal Rights and Duties

Information for City Attorneys and Other Municipal Officers, Summarizing Important Court Decisions and Legislation

Conducted by A. L. H. Street, Attorney at Law

Ordinance Discriminating Against Non-resident Advertising Held to Be Void

An ordinance is held by the Illinois Supreme Court to have been void where it purported to prohibit the distribution of advertising matter without a license and execution of a bond to be approved by the city clerk, but made an exception in favor of advertisements of home entertainments and of sales by citizens on permit from the mayor being obtained. (City of Elgin vs. Winchester, 133 Northeastern Reporter, 205.) The Court remarked:

"In our judgment, under the authorities, the ordinance is void as being discriminatory between residents and non-residents as to the payment of license fees. A citizen of the city may procure a permit without the payment of a license fee, and distribute advertisements concerning sales by such citizens. Beyond question the ordinance permits local merchants to advertise by the distribution of circulars or pamphlets. A statute or ordinance which in imposing a license tax discriminates in favor of the residents of a state or city and against non-residents of the same class is unconstitutional."

Jurisdiction of Municipal Courts Held to Be Limited to Acts Committed Within Boundaries

In the case of Rieser vs. Ward, 236 Southwestern Reporter, 255, it is decided by the Kentucky Court of Appeals that under provisions of the Commonwealth's constitution the police court of a city cannot be given jurisdiction of offenses committed on property belonging to the city outside its boundaries, nor on highways maintained by it outside such boundaries. So, it is held that statutes empowering the city of Louisville to acquire parks outside the city limits are invalid in so far as they purport to give jurisdiction to the police court over offenses committed on a parkway connecting the city with a park but lying outside the city limits.

General Funds Not Chargeable With Special Assessment Deficiency

A mutual mistaken belief by the city and its contractor that special assessments of property benefited would produce sufficient funds to pay for a local improvement does not authorize the city to pay for such improvement from its general funds. In such case there is no moral obligation on the city to so pay from it general funds. So the city cannot issue bonds creating a general indebtedness to make such payments, especially where the charter forbids allowance, or recognition of any demand against the city not a valid claim against it at the time of its creation. (Washington Supreme Court, Pratt vs. City of Seattle, 189 Pacific Reporter, 565.)

Compulsory Municipal Bonus to Employees While in Military Service

In the case of Henn vs. City of Mt. Vernon, 189 New York Supplement, 851, the Appellate Division of the New York Supreme Court confirmed the validity of a New York statute requiring cities to pay their officers and employees while engaged in military service the difference between their salaries and the lesser amounts received while so engaged. It was decided that the law does not provide for an unconstitutional disposal of municipal funds. In the course of its opinion the Court says:

"The World War and our participation in it constituted a very great emergency, and the very widest scope in favor of legislative power to provide for action therein should be given by way of constitutional interpretation. We have recently had a striking instance of this in the decisions both of the Court of Appeals and of the United States Supreme Court maintaining the constitutionality of the recent rent statutes of this state. It is, indeed, now somewhat difficult to define what the lawmaking power may not do in aid of the prosecution of a war in which the nation is engaged, and therefore as well each component part of the nation."

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Aldermanic Districts Are Not Necessarily to be Apportioned According to Population

The validity of the New York Aldermanic Reapportionment Act (Laws 1921, c. 670) was under fire in the recent case of People on relation of Boyle v. Cruise, 189 New York Supplement, 338. One of the principal objections made against the law was that it provided for the formation of aldermanic districts on a basis disproportionate to population. On this point the Court says:

"As to the first ground, I think the challenge cannot be sustained. The aldermanic districts are apportioned substantially as are the assembly districts in the city. That apportionment has been acquiesced in and has not been judicially questioned. Nor do I think that it can be successfully questioned. There is no requirement in the constitution that the apportionment of aldermanic districts should be based upon the equality of population. In the matter of Dowling, 219 N. Y. 44, 113 N. E. 545, the Court of Appeals quoted from the Revised Record of the Constitutional Convention as found at page 54 of the record, where it reads:

"'We believe the provision to be sound in principle that somewhere in every representative government there should be a recognition of variety of interest and extent of territory, as well as of mere numbers united in interest and location. Such a departure from the rule of strict numerical representation is recognized by the Constitution of the United States in the organization of the Senate, by the constitution of the state of Pennsylvania in limiting the representation which the city of Philadelphia may have in its Senate to one-sixth of its members, and by the constitution of the state of Maryland in limiting the representation which the city of Baltimore may have. Similar provisions have been adopted by the state of Ohio affecting Cincinnati and Cleveland, the state of Missouri affecting St. Louis, the state of Rhode Island affecting Providence, and by other states of the Union having large cities. It is the rule, rather than the exception, throughout the Union.'

"It is not claimed that the difference in population was occasioned by any attempt to gerrymander the districts, as that word is commonly used. Staten Island has become a part of the Greater City of New York, with large territory and many substantial interests, which it is peculiarly within the province of the board of aldermen to supervise. To require an aldermanic district upon Staten Island to represent the same numerical population would be to disregard many material interests in that locality which are the subject of supervision and regulation by the board. Notwithstanding the general rule where such interests are not involved, where the equality of population is a fair basis of apportionment in a city situated as is New York City, with a congested population in certain localities and a more limited population in outlying districts, the interests of the community may well require those outlying districts to be represented to a greater extent than would be the case if their right to representation were measured simply by the number of their inhabitants. Without any requirement in the constitution to make the extent of the population the basis of the apportionment, other interests are entitled to be regarded in determining the division of aldermanic districts, and I am unable to find any such discrimination as violates any principle which lies at the foundation of a fair apportionment and division of such districts."

On the Calendar of Conventions

JULY 27-28.—WILMINGTON, N. C.
North Carolina Commercial Secretaries' Association. Annual meeting. Secretary, W. T. Ritter, Winston-Salem, N. C.

JULY 27-29.—MANISTEE, MICH.
Michigan Commercial Secretaries' Association. Semi-annual meeting. Secretary, C. W. Otto, Board of Commerce, Pontiac, Mich.

AUGUST 15-17.—CLINTON, IOWA.
League of Iowa Municipalities. Annual meeting. Secretary, Frank G. Pierce, Marshalltown, Iowa.

AUGUST 15-18.—SAN FRANCISCO, CALIF.
International Association of Fire Engineers. Annual meeting. Secretary, James J. Mulcahey, City Hall, Yonkers, N. Y.

AUGUST 19-26.—MINNEAPOLIS, MINN.
American Institute of Park Executives. Annual convention. Secretary-Treasurer, Emmett P. Griffin, Superintendent of Parks, East St. Louis, Ill.

AUGUST 21-SEPTEMBER 2.—EVANSTON, ILL.
National School for Commercial Secretaries. Address Robert B. Beach, Business Manager, Association of Commerce, Chicago, Ill.

AUGUST 22-25.—NEW BEDFORD, MASS.
International Association of Municipal Electricians. Annual convention. Secretary, Clarence R. George, City Electrician, Houston, Tex.

AUGUST 28-SEPTEMBER 2.—DETROIT, MICH.
National Safety Council. Annual Safety Congress. Secretary, W. H. Cameron, 168 North Michigan Avenue, Chicago, Ill.

AUGUST 29-31.—WILLIAMSPORT, PA.
League of Cities of the Third Class in Pennsylvania. Annual convention. Secretary, Fred H. Gates, City Clerk, Wilkes-Barre, Pa.

SEPTEMBER 12-15.—NEW BEDFORD, MASS.
New England Water Works Association. Annual convention. Secretary, Frank J. Gifford, 715 Tremont Temple, Boston, Mass.

SEPTEMBER 18-23.—PALO ALTO, CALIF.
Western Summer School of Community Leadership. Address: Mrs. C. A. Simmons, Registrar, American City Bureau, Merchants' Exchange Building, San Francisco, Calif.

SEPTEMBER 19-23.—PALO ALTO, CALIF.
League of California Municipalities. Annual convention. Executive Secretary, W. J. Locke, Ninth Floor, Pacific Building, San Francisco, Calif.

SEPTEMBER 25-28.—HOT SPRINGS, ARK.
Southwest Waterworks Association. Annual convention. Secretary, E. L. Fulkerson, 617 Washington Street, Waco, Tex.

OCTOBER 1-6.—CLEVELAND, OHIO.
American Society for Municipal Improvements. Annual convention. Secretary, Charles Carroll Brown, P. O. Box 234, St. Petersburg, Fla.

OCTOBER 16-19.—CHICAGO, ILL.
American Public Health Association. Annual meeting. Secretary, A. W. Hedrich, 370 Seventh Avenue, New York, N. Y.

OCTOBER 23-25.—CHICAGO, ILL.
National Association of Commercial Organization Secretaries. Annual meeting. Secretary-Treasurer, John E. Northway, Chamber of Commerce, Hamilton, Ohio.

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CIVIC ART

Werner Hegeman and Elbert Peets. The Architectural Book Publishing Company; Paul Wenzel and Maurice Krakow. New York. 1922. VI + 298 pp. Illustrated. $40.

This monumental work, called the "American Vitruvius" after Colen Campbell's classic "Vitruvius Britannicus," published early in the Eighteenth Century, aims to bring out the necessity of extending the architect's sphere of influence, to emphasize the essential relation between a building and its setting, the necessity of protecting approaches, the desirability of grouping buildings into harmonious ensembles, and thus achieving unity, at least of a group of buildings and possibly even districts and entire cities.

The work itself is divided into seven great sections: the modern revival of civic art, plaza and court design in Europe, the grouping of buildings in America, architectural street design, garden art as civic art, city plans as unified designs, and the plan of Washington. A comprehensive index of illustrations and a list of books is included. The subject is so vast that it is impossible to mention more than a few of the topics discussed. In Chapter 3, The Grouping of Buildings in America, are the world's fairs, the development of the American college campus, hospital and other institutional groups, and American civic centers. In Chapter 6, City Plans as Unified Designs, there are discussed numerous European examples, American radial plans, rectangular plans, town extensions, gridiron and diagonal layouts, garden suburbs and garden cities, American war housing, and residential layouts.

No part of this book treats of the engineering aspect of city planning, for the authors feel that the city planning profession has been drifting too strongly in the directions of engineering and applied sociology. They recognize that this is natural, for there are problems of such tremendous importance in those fields which public officials and property owners can be induced to recognize, that the profession is attracted to them. But they contend that "while it is easier and more respectable to be an engineer, 'an uplifter,' or a business man than it is to be an artist," our city planning projects should not be finally decided without the sanction of at least one trained man whose primary interest is in the dignity and beauty of form and color.

A CITY PLAN FOR SPRINGFIELD, MASS.

Progress Report by the Planning Board, May, 1922, compiled and edited by the Technical Advisory Corporation, New York, N. Y.

This interesting pamphlet of sixty pages, well illustrated, discusses the city plan of Springfield, zoning, the equalization of land tax valuation, the distribution of public property, such as parks, playgrounds, and public schools, the difficult problem of street traffic and transit, including the bridge trolley loop, railroad stations and track relocation, and such minor problems as the public school athletic field, the location of certain new schools, the fire headquarters and various stations. It presents as an appendix an interim zoning ordinance. Particularly valuable are the illustrations of the typical field survey sheet, the regional thoroughfare map, the existing conditions maps, diagrams showing the relation of population to real estate valuation, and the population map. Springfield, already blessed with a magnificent municipal group, is on its way to secure a well-rounded plan, and the story, therefore, cannot fail to interest those who are studying similar problems elsewhere.

LANDSCAPE GARDENING

Frank A. Waugh. John Wiley & Sons, Inc., New York. 1922. XXI + 344 pp. Illustrated. $5.00 postpaid.

This text-book is particularly timely because of a growing appreciation of the value of landscape gardening in making city and suburban life more attractive. It covers the general subject of surveying, landscape gardening details, architectural details, domestic landscape gardening, civic problems, plant materials and planting, and the development of landscape in general. A bibliography on landscape gardening adds greatly to the value of the text. City officials will find in this text an excellent treatment of railroad station grounds, court house squares, the town common, playgrounds, civic centers, country school grounds, and a discussion of neighborhood parks, together with many helpful suggestions on street trees and on recreational facilities such as baseball fields, tennis courts and village centers.

AUTOMOBILE GREEN BOOK

Official Guide Book of Automobile Legal Association, 6 Beacon Street, Boston, Mass. No. 1, New England States and Trunk Lines West and South. No. 2, New York, New Jersey, Canada, Pennsylvania, and the East. 1922. Published by Scarborough Motor Guide Company, Indianapolis, Ind., and Boston, Mass. $3.00.

THE PURPOSES OF ZONING

"Zoning to Secure Amenities," by Barry Parker, F. R. I. B. A., and "Zoning Industrially and in Regard to Public Services," by W. H. Gaunt, O. B. E. Papers read at the meeting of the Town Planning Institute, 4, Arundel Street, London, W. C., England, March 3, 1922, with the discussion thereon at that meeting. Quarto. 22 pp. Containing also a statement on the height of buildings in London, prepared by the Council of the Institute, and one on "American Experience in Regard to High Buildings," specifically in New York City. (Apply to the Town Planning Institute.)

MOTOR VEHICLE COMMON CARRIERS

"State Regulation of Motor Vehicle Common Carriers." A preliminary report based on state laws in force January 1, 1922, and on bills pending before State Legislatures in session March 1, 1922. Published by the Motor Vehicle Conference Committee, 366 Madison Avenue, New York, N. Y. Quarto. 8 pp. (Apply to the committee.)

ZONING

By Edward M. Bassett, counsel of the Zoning Committee of New York. Revised 1922. Published by the National Municipal League, 261 Broadway, New York, N. Y., as Technical Pamphlet Series No. 5. A compact, but complete, handbook of zoning, covering the story of the spread of this movement, the reasons for zoning, the experiences of the various zoned cities, the correct principles and the best practice, the legal pitfalls, and a selected list of references. 32 pp. (Apply to publishers.)

MILWAUKEE'S TAX PROBLEM

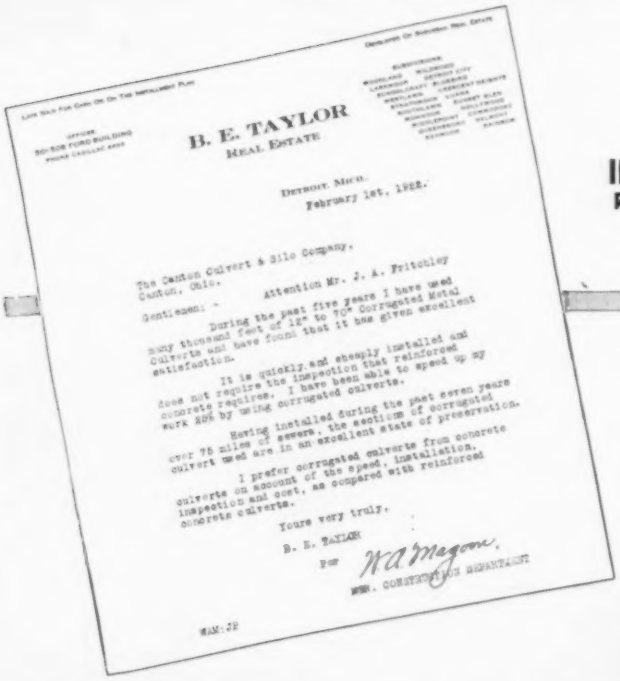
A 48-page pamphlet issued in 1921 by the Citizens' Bureau of Milwaukee, presenting the annual report for the year 1921 and including not only a summary of the work of the staff of the Bureau, but an appraisal of general conditions in the City Hall and the County Court House, a report of the civic progress in city and county governments, and a work-program for 1922. Growing expenditures, sources of revenue, the need for a financial plan, and policemen's and teachers' pensions, are parts of the discussion, and there is a report of engineering studies of bituminous macadam pavements, refuse disposal, and filtration in Milwaukee. (Apply to Harold L. Henderson, director, Citizens' Bureau of Milwaukee, Milwaukee, Wis.)

STATE SANITATION

A 16-page pamphlet under this title, by George C. Whipple, Professor of Sanitary Engineering, Harvard Engineering School. Reprint No. 710 from the U. S. Public Health Reports, November 25, 1921. Read at the Conference of State Sanitary Engineers, Boston, June 1, 1921. Definite, practical counsel and conclusions on the functions and administration of state health departments and on the work and standards of sanitary engineers. Price 5 cents. (Apply to the Government Printing Office, Washington, D. C.)

WATER-SUPPLY FOR WARREN, OHIO

"Report on the Water Resources of the Mahoning River, including Stream Control for Sanitary Purposes and for Water Supply." Prepared for the Mayor and City Council of the city of Warren, Ohio, by Alexander Potter, consulting engineer, 50 Church Street, New York, N. Y. November 1, 1920. 148 pp. with plans, profiles and typical detail drawings. A comprehensive



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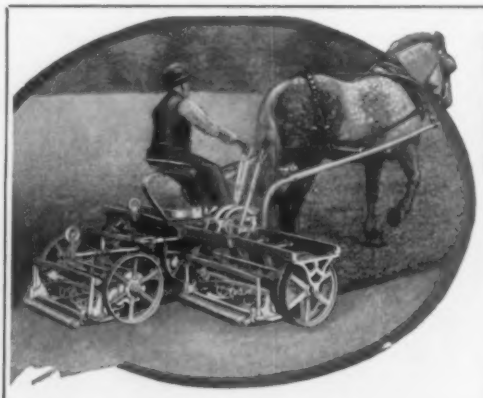

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and detailed study of the maximum economic development and conservation of the waters of the Mahoning River as affecting the city of Warren and the entire Mahoning Valley. Eight appendices take up in detail the various phases of the project referred to in the main report. (Apply to E. H. Braunberns, Director of Public Service, Warren, Ohio.)

SANITATION IN NEW JERSEY

Proceedings of the Forty-seventh Annual Meeting of the New Jersey Sanitary Association, held December 9 and 10, 1921, Lakewood, N. J. 75 pp. Including papers on "Bovine Tuberculosis as a Contributory Source of Human Tuberculosis;" "Coordination, the Need for Future Progress in Public Health;" "Public Health Administration in New Jersey;" "Importance of Maintaining High Educational Standards for Those Who Seek to Practice the Healing Art;" "B. Welchii and the Montclair Water-Supply;" "The Recent Epidemic of Typhoid Fever in Burlington County;" "The Problem of Garbage Disposal in the Cities of the Metropolitan District of New Jersey;" "Legal Enforcement of Health Laws." (Apply to Dr. Edward Guion, Secretary New Jersey Sanitary Association, Atlantic City, N. J.)

DETROIT'S GROWTH

The June 1, 1922, issue of Public Business, published every two weeks by the Detroit Bureau of Governmental Research, Inc., shows in tabular form and by comparative curves the growth of Detroit since its reorganization in 1824 in respect to activities, population, taxes, debt and assessed wealth. (Apply to publishers.)

A COAL MANUAL

F. R. Wadleigh, Member American Institute Mining & Metallurgical Engineers. National Coal Mining News, Cincinnati, Ohio. 1921. 184 pp. $2.50.

A small-sized, handy manual, particularly prepared for buyers and users of coal. It contains information regarding the various uses of coal, its classifications, analysis of purchases, specifications and what they should cover, methods of sampling. It also contains some interesting suggestions regarding boilers and furnaces and methods of firing them, and valuable data on the storage of coal. This book should be in the hands of every municipal power-plant engineer who is using coal in any large quantity.

A CATECHISM OF STEAM ENGINEERING

Michael H. Gornston, Steam Engineer, Department of Education, New York City. D. Van Nostrand & Company, New York. 1922. VI + 428 pp. Illustrated. Price $4.00.

A well-prepared set of 1300 questions which may come up in the work of the power plant engineer, each with a simply worded answer. The value of these questions and answers is greatly enhanced by a carefully prepared index which enables the reader to find the questions on any subject on power plant operation which may be puzzling him.

SCHOOL GROUNDS AND PLAY

By Henry S. Curtis. 1922. Published by the Bureau of Education of the Department of the Interior, as Bulletin, 1921, No. 45. 32 pp. Giving interesting information on the new state laws, on the recreational element in the programs of public schools, and on various details of organized play and public recreation. A brief but valuable bibliography is included. (Apply to the Government Printing Office, Washington, D. C.)

PHILADELPHIA'S TRACTION PROBLEM

"Rapid Transit Handbook: Fares—Rentals—Taxation—Benefited Property Assessments—Men and Management." Respectfully addressed to Mayor of Philadelphia, members of City Council, Public Service Commission, Joint Transit Committee, P. R. T. stockholders and interested citizens generally, by T. E. Mitten, Chairman, Executive Committee. Philadelphia Rapid Transit Co. May, 1922. 8 pp. Giving conclusions and "The Ultimate Answer," involving city ownership and company operation. (Apply to Mr. Mitten.)

RECREATION IN OAKLAND, CALIF.

Bulletin of information about the Recreation Department of Oakland. Pocket size. 32 pp. Illustrated. "The object of this booklet is to inform you of the facilities for play and recreation in Oakland and to invite you to join them. It is also designed to advertise to the world the very exceptional advantages our city has to offer. Extra copies can be had by anyone." (Apply to Jay B. Nash, Superintendent of Recreation.)

CHICAGO TRACTION

Fourteenth annual report of the Board of Supervising Engineers, Chicago Traction, covering the fiscal year ended January 31, 1921. Published by the Board, 1921. Covering the general summary for the year, of Boards 1 and 2, and a summary of previous reports, an analytical review of operations, financial and statistical exhibits and schedules, and a detailed description of the work of the Engineering Department. 116 pp. Views, maps, tables. (Apply to Bion J. Arnold, Chairman of the Board.)

CINCINNATI'S COMMUNITY CHEST

A 32-page pamphlet of handy size, containing suggestions for presenting the facts about the Community Chest to the children of Cincinnati schools. A Report of the School Committee of the Cincinnati Community Chest and Council of Social Agencies. Showing how to introduce this subject into the work of the regular classes. (Apply to Randall J. Condon, Superintendent of Schools, Cincinnati, Ohio.)

THE BUFFALO PLAN

A 16-page folder of quarto size, one full side devoted to a map of Buffalo showing the general development of the Plan of Buffalo. The other pages explain the value and cost of the Plan and urge its adoption. Signed by the Buffalo City Planning Association, Inc., Buffalo Public Library Building, Buffalo, N. Y. (Apply to the Association.)

DIPHTHERIA PREVENTION

"Stamp It Out of the Schools!" A study of the menace of diphtheria, with suggestions for its prevention. A 16-page pamphlet issued by the Committee on Public Health of the Cleveland Chamber of Commerce. Approved by the Board of Directors January 20, 1922. Urging every Chamber member to spread the gospel of diphtheria prevention through the administration of toxin-antitoxin. (Apply to Roger G. Perkins, chairman of the committee.)

THE EFFECT OF ZONING ON LAND VALUES

A paper under this title, by S. G. Baxendale, F. S. I., read at the meeting of the Town Planning Institute, 4, Arundel Street, London, W. C., England, on April 7, 1922. 15 pp. Including also the discussion at the meeting. (Apply to the Town Planning Institute.)

INJURED SHADE TREES

"How to Care for Injured Shade Trees." Stencil Bulletin 50, revised, published and distributed by the Agricultural Extension Service of the College of Agriculture of the University of Wisconsin, K. L. Hatch, assistant director, the United States Department of Agriculture cooperating. 5 pp. of mimeographed text, with 1 p. of drawings showing how to repair trees that have suffered various injuries. (Apply to the publishers.)

THE CHILD AND THE COURT

An address with this title, by Hon. Charles L. Brown, President Judge of the Municipal Court of Philadelphia, before the civics teachers of the Philadelphia Public Schools, October 20, 1921. 16 pp. Explaining how juvenile offenders are dealt with in the Juvenile Division of the Municipal Court in Philadelphia. "We treat the children of different mental capacities differently, but we treat them all, no matter how they are in the scale, humanely." (Apply to author.)

PUBLIC SERVICE THROUGH THE COURTS

Two pamphlets issued under the auspices of the Municipal Court of Philadelphia in the series of 1921-1922 of Public Service Addresses: No. 9, containing two addresses, "The Value of Probation," by Rev. Russell H. Conwell, D. D., and "The National Development of Probation," by Charles L. Chute, secretary, National Probation Association, under the auspices of the Educational Department of the Municipal Court, December 23, 1921. 24 pp. "Humanizing Justice," a brief study of the Municipal Court of Philadelphia, by Maximilian P. E. Groszmann, Ph.D., under the auspices of the National Association for the Study and Education of Exceptional Children. 32 pp. "That the probation service of the Juvenile Division alone more than pays for its maintenance is proven by the figures presented in the Court Reports." (Apply to the Municipal Court of Philadelphia.)

NEW BRUNSWICK MUNICIPALITIES

Copy of the Proceedings of the Sixteenth Annual Convention of the Union of New Brunswick Municipalities, held in the city of Saint John August 24-26, 1921. Containing addresses on Safe Milk and Butter Production; City Government Under the Manager Plan; Uniform Municipal Accounting; Commission Government; Municipal Advertising—Its Nature—Does It Pay? Quarto. 61 pp. (Apply to J. King Kelley, secretary-treasurer of the Union, Saint John, N. B.)

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News for City and County Engineers, City Managers, Water-Works Superintendents, City Controllers, Park Superintendents, Purchasing Agents, and Others Interested in the Economical Construction and Efficient Operation of Public Improvement Undertakings

Road Oil Distributors

In the early days of permanent road construction, when but a comparatively small amount of bituminous binders was used annually, the horse-drawn distributor answered every purpose. In these times, however, when millions of gallons of bituminous materials and road preservatives are applied every year, the horse-drawn distributor has been supplanted by equipment that will handle material more rapidly and in much larger quantities.

The Champion distributor, as illustrated, is made by the Good Roads Machinery Company, Inc., Kennett Square, Pa. The distributing unit consists of an encased tank, a battery of burners, a series of pipes, a distributing manifold, and a pump which is driven by a power take-off shaft from the motor transmission and is located directly in the discharge line from the tank.

The standard distributing manifold is 8 feet in width, and is made in two 4-foot sections so that the material can be applied in varying widths as desired. It can be furnished in any length that may be required up to 16 feet, the longer manifolds necessarily costing somewhat more than the shorter sizes. Manifolds longer than 8 feet are designed only for surface treatment applications. The manifold is suspended by means of swivel joints so that it can be swung up and carried away from the road when not in actual use. The distributor is so designed that there are only four valves to be operated in the entire piping system.

Two sets of distributing nozzles are furnished, one of ⅜-inch and the other of ½-inch diameter in the discharge opening. Other intermediate sizes may be used if desired. The pump for applying the material to the road is of centrifugal pattern and is installed in a heated compartment. It is driven by sprockets from the power take-off of the automobile motor transmission. The heating device consists of a number of specially designed oil burners located beneath the tanks. They will increase the heat of a full tank load of material from 225 to 350 degrees Fahrenheit in one hour and a half. Kerosene atomized by air pressure is used as a fuel and is carried in 20-gallon tanks. A

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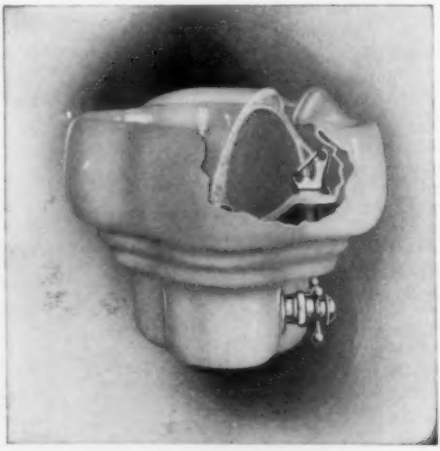

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small air pump operated by hand maintains pressure in the fuel tank.

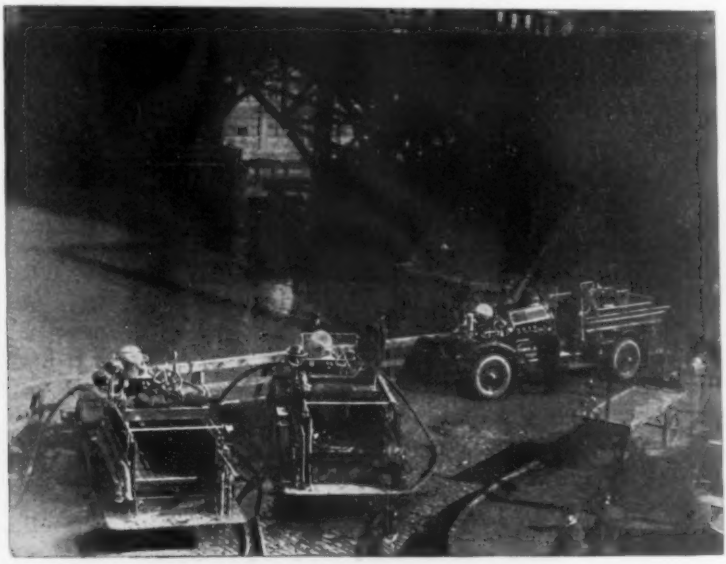
The tank used with this distributor is of steel and completely jacketed. A large number of flues extend upward diagonally through the tank. These flues are so spaced that the heat is equally distributed throughout the material. The tank is made of 3/16-inch steel with flanged heads ¼-inch thick. The 600-gallon tank is equipped with 16 3-inch flues, the 800-gallon tank with 18 3-inch flues, and the 1,000-gallon tank with 20 3-inch flues. The tanks are mounted on 3½-, 5- and 7½-ton trucks, respectively.

No. 10, 12 hours; No. 14, 16 hours; No. 22, 15 hours; No. 23, 11½ hours; No. 25, 15 hours; No. 27, 2 hours; No. 28, 8 hours; No. 40, 16 hours; No. 43, 13 hours; No. 59, 15 hours; No. 98, 5¼ hours; No. 107, 12 hours. In addition to these, eleven Ahrens-Fox pumpers were in reserve in various engine houses throughout the city.

Pittsburgh Testing Laboratory Offices

The Pittsburgh Testing Laboratory, Pittsburgh, Pa., has announced the opening of a sales office with a complete inspection bureau at 1864 Railway Exchange Building, St. Louis, Mo., with N. C. Hoyles as District Manager. Mr. Hoyles is a graduate of Queens University, and has taken a post-graduate course at the University of Toronto. He has been with the Pittsburgh Testing Laboratories since 1908 in various capacities.

Harry M. Wey has been appointed Manager of the Chicago District of the Pittsburgh Testing Laboratory, with offices at 1560 Monadnock Block, Chicago, Ill.



MOTOR PUMPERS WORKING AT CHICAGO'S LATEST BIG FIRE

Ahrens-Fox Pumpers at Chicago's Latest Big Fire

According to the Chicago Fire Department Headquarters, in the big fire of March 15, 1922, fourteen Ahrens-Fox pumping engines were in service during the pumping time, aggregating 163 hours, without any mishap or trouble. One Ahrens-Fox pumper, Engine Company No. 22, had 1,100 feet of 2½-inch hose laid, giving a fine stream at the nozzle. The real demonstration of efficiency was given by three Ahrens-Fox machines on the west bank of the river at Jackson Boulevard. Engines 14 and 98, each with two leads laid off, were sending water about 900 feet. Engine 59, with one lead, was sending water about 1,500 feet. Three pumpers were in suction at the river with all of 14 feet lift from the water-level to the suction port.

The story of the fire is well told in the following report of engine companies' hours worked: No. 3, 8½ hours; No. 7, 14¾ hours;

Boston Engineers Move Offices

Fay, Spofford & Thorndike, consulting civil engineers, formerly at 15 Beacon Street, have announced the removal of their offices on July 1 to the Massachusetts Trust Building, 200 Devonshire Street, Boston 9, Mass.

For Municipal Service

LEE-4D

One Body for Garbage, Refuse and General Hauling

The new Lee 4-D refuse body which dumps without power is being used by a great many cities for hauling light rubbish, consisting of papers, boxes and trash of all kinds, garbage and refuse, crushed stone, excavated earth, barrels of tar, tools, supplies and other materials used by maintenance gangs in street work.

Bulletins 75-AC and 78 give specifications on all types. Secure these bulletins when you are making plans for the purchase of a new dumping body for any light-weight truck.

Bulletin 77-AC gives cost data of the operation of this equipment as used in Evanston, Ill.

LEE TRAILER & BODY COMPANY

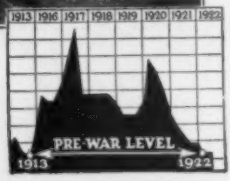
2343 South La Salle Street CHICAGO, ILL.

Don't Wait for That Iron Fence!

The present prices on Enterprise Iron Fencing are the lowest in years. This is due largely to the reduced cost of iron, which went back to a pre-war level early this year. We believe our quotations will surprise you agreeably. Write for our new illustrated catalog and our free blue-print offer.

ENTERPRISE IRON WORKS

2464 Yandes Street, Indianapolis, Indiana



Cost of Iron Back to 1913

Free Blue Print.
Free blue-print showing Enterprise Fencing on your ground. Write for illustrated catalog and quotation today.

ENTERPRISE FENCING

Buy Now for Less.
Protect and beautify Schools, Hospitals, Parks, Estates, Public Buildings, Cemeteries, Asylums. Lowest cost in years.

STARTING TO CLEAN A SWIMMING POOL BY THE VACUUM SYSTEM

A Vacuum Cleaning System for Swimming Pools

Those who have been entrusted with the caretaking of swimming pools realize that sediment will accumulate upon the bottom and sides of the pool, in spite of the most careful filtration. This foreign matter finds its way into the pool by various routes. Dust is blown into the pool room through the windows or tracked into the pool by bathers, who also deposit hair, lint, cuticle or even plain dirt in the water, most of which settles during the quiet hours of the night.

To maintain a clean pool under these conditions has been an expensive proposition in the past, for thorough cleaning has been accomplished only by draining off the pool and scrubbing down the tile, losing the 400,000 to 500,000 gallons of water contained in the pool, and necessitating the reheating of the fresh water to the proper temperature, usually 70 degrees. The practice of scrubbing down the pool is resorted to several times per month and becomes quite an item of expense.

The United Electric Company, Canton, Ohio, has placed on the market the Tuec pool cleaning tool, which is virtually a vacuum cleaner especially designed for this service. This tool is made of phosphor bronze of sufficient weight to lie upon the bottom of the pool and suck up all sediment. It is built with a swivel connection, permitting movement in any direction. A stiff-bristled brush 15 inches long, with a port on each side, gathers up all the fine matter on the floor and walls of the pool and by a process of strong suction ejects this foreign matter into the sewer. A flat-surfaced inlet valve is placed below the water-line when a refiltering pump of the centrifugal is used. When a piston pump is used, the inlet valve may be located above the water-line if it is more convenient. To the inlet valve of the phosphor bronze a hose terminal is coupled with a screw connection. The other end of the 50-foot length of special pool hose is connected to the swivel fitting of the tool proper.

The handle of the tool is a heavy socket with a bayonet locking device to receive the extension handles. Two brass extension handles, one 6-foot and one 7-foot, are furnished with the equipment, to provide a total length of 16 feet for the tool, making every part of the largest pool accessible. In using the tool, the water drawn out during the cleaning period is ejected into the sewer by a by-pass connection and not returned to the filter.

Sharp Lawn-Mowers Insure Faultless Lawns

Sharpening the lawn-mowers used on golf-links, parks and public grounds has been a bothersome, as well as an expensive, labor, as will be testified by all whose duty it is to maintain extensive lawns. All this bother and loss of time is claimed to disappear with the Peerless lawn-mower sharpener, made by the Fate-Root-Heath Company, Plymouth, Ohio, which sharpens and accurately trues the blade of the mower in 15 minutes.

Employment Service for Engineers

The Federated American Engineering Societies, 29 West 39th Street, maintains a free employment bureau for engineers seeking professional and industrial positions. This bureau is a nation-wide clearing-house for the employment of technical men. The service rendered is valuable both to the employer and the employee. About thirty associations and federations throughout the United States are members of the Federated Societies. The employment bureau has advised THE AMERICAN CITY that those of its readers who are officials seeking men for special engineering work, are given a cordial invitation to make free use of the bureau at any time. The bureau is in a position to furnish civil, mechanical and electrical engineers, appraisers, accountants, purchasing engineers, inspectors, traffic specialists, city planners, and management specialists. The administration of the employment bureau of the Federated American Engineering Societies is in charge of W. V. Brown, Manager, 29 West 39th Street, New York City.

PAGE PROTECTION FENCE

—between Playground and School Garden

WHAT constitutes the ideal public playground? Is it not one where the children are always kept within their proper bounds—where the big boys are prohibited from invading the domain of the little fellows—where mischievous youngsters are prevented from trampling down the plants and flowers in school gardens which happen to adjoin the playground?

You may attain such an ideal condition if your playground is vigilantly watched by a host of monitors, whose eyes are constantly glued on the elusive urchins. That is one way to do it! But a decidedly cheaper and more effective way is to inclose each section of the playground with a strong, reliable, Page-Protection Fence.

Erect a Page-Protection Fence on your playground now and eliminate the need of constant watchfulness. It is absolutely unclimbable because the children cannot get a foothold on its closely woven fabric. It is the most economical means of enclosing a playground because its initial cost is far offset by its durability and long service.

Page Steel and Wire Company

Bridgeport, Connecticut

District Sales Offices:

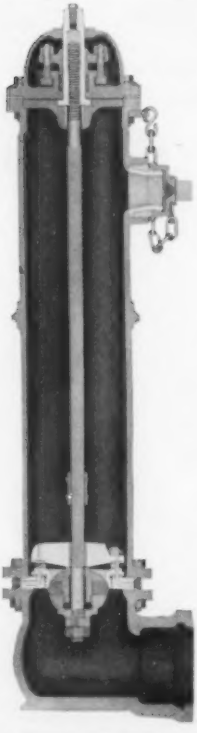
Chicago, New York, Pittsburgh, Portland, Ore., San Francisco

A Patented Compression Fire Hydrant

The patented compression fire hydrants made by the Darling Valve & Manufacturing Company, Williamsport, Pa., have a number of features of interest to the water-works man and the fire department official. The bronze operating nut at the top of the valve stem is in one piece and works directly on the valve rod. A screw in the top of this operating nut permits the lubrication of the operating threads without disturbing any other parts. The operating threads of the valve stem, being at the top of the hydrant, are accessible for lubricating, and are protected from injury by pebbles and other foreign matter which may be in the water passing through the hydrant. The hydrant cover may be taken off by removing two bolts. Absolute drainage on two sides prevents moisture from collecting on the under-side of the hydrant cover.

The flanged connection of the barrel to the elbow or base makes it possible to point the hydrant nozzles in any one of six positions on 4- and 4½-inch, eight positions on 5-inch and twelve positions on 6-inch hydrants.

The area of the hydrant barrel is about three times as great as the area of the valve opening, so that there is no perceptible loss in pressure caused by friction in delivering water to the nozzle connections. The inside diameter of the barrel on 4 and 4½-inch hydrants is 7¼ inches; on 5-inch, 8½ inches; and on 6-inch, 9½ inches. All the internal parts, including the main valve-seat, seat gaskets and drip valve-seats, can be removed through the top of the hydrant merely by unscrewing the bronze main valve-seat from the bronze seat ring. The main valve is made of sole leather, and is turned to a conical form to fit the tapered bronze seat, thus effecting a gradual closing of the hydrant, eliminating all possibility of water-hammer. The valve rod is in one piece, operating in the center of the hydrant, direct from the operating nut to the inlet valve. It has a vertical movement and is entirely free from torsional strain. The bronze hose nozzle is made larger in diameter on the inside end and tapering to size, to facilitate the flow of water.



A HYDRANT USED IN MANY CITIES

The elbow or base is made perfectly plain and contains no operating mechanism or guides; thus there are no places for sediment to collect in and cause any undue wear and interfere with the free and easy operation of the hydrant.

A CAN CARRIER FOR STREET CLEANERS

Rochester Can Acquires Menzies Company

The Rochester Can Company, Rochester, N.Y., has announced the purchase of the entire stock, equipment and good-will of the Menzies Street Cleaner Company of Amsterdam, N.Y. The Menzies Company has for years been regarded as one of the most prominent manufacturers of street cleaning equipment, both horse-drawn and hand types. Its line also includes steel shovels, a brand well known to hardware men and contractors. It is the plan of the Rochester Can Company to operate the business in its present location until such time as space can be provided in the Rochester plant.

Remarkable Maintenance Record

In 1881, Trinidad Lake asphalt paving was laid on Twelfth Street, Northwest from M to O Streets, Washington, D. C. For the past 13 years the maintenance cost of this street has been only 1.77 cents per square yard per year.

In the advertisement of the Barber Asphalt Company, Philadelphia, Pa., appearing in the May issue of THE AMERICAN CITY, this record was incomplete, as the figure 13 was omitted.

TIFFIN STREET FLUSHERS

and

TIFFIN STREET SPRINKLERS

in these large cities mean

CLEANLINESS, SANITATION, HEALTHFULNESS

Montpelier, Vt.	Warren, Ohio	Billings, Mont.
Schenectady, N. Y.	Durham, N. C.	Fargo, N. D.
Norfolk, Va.	Portland, Ore.	Waco, Texas
Erie, Pa.	Seattle, Wash.	Peoria, Ill.

Ask them about our equipment. Write us for catalog and engineering data.

THE TIFFIN WAGON CO., Tiffin, Ohio

Header Curbs are Out of Date

Header curbs are unsatisfactory—they are expensive and soon wear under traffic. Up-to-the-minute road builders are discontinuing them for

International Steel Paving Guards

These guards eliminate all forming for headers—the only form required is the concrete road form. They are made of standard structural angle with inch wide anchors cut out of the horizontal leg itself every ten inches, twisted and bent like reinforcing bars, and extend into the concrete holding the vertical or guarding leg of the angle rigidly in place.

These guards absorb and distribute shocks of traffic—reinforce the paving base—and prevent disintegration of any kind of surface. They are adapted to all types of surface and foundation.

Use them on your next job.

A—Paving Guard. B—Anchors. D—Base. F—Shoulder.

International Steel Tie Co., Cleveland, O.

THE EDISTO RIVER BRIDGE AT JACKSONBORO, S. C.

Keeping Steel Highway Bridges in Condition

We reproduce above two different views of the Edisto River Bridge, Jacksonboro, S. C., which contains a 192-foot span and two 130-foot fixed spans with an 18-foot roadway. The bridge was designed and built by the Atlantic Bridge Company, of Roanoke, Va., and Charlotte, N. C., under the supervision of the South Carolina State Highway Department. It was erected for the Charleston-Colleton Counties, South Carolina, with Federal aid. All structural steel work on this bridge is protected with two field coats of Dixon's Silca-Graphite paint, made by the Dixon Crucible Company, Jersey City, N. J.

The large picture shows a bridge over Lake Summit, near Tuxedo, N. C., and is a 228-foot span with a 24-foot roadway. The substructure and superstructure were designed and built by the Atlantic Bridge Company for the Lake Summit Company, and the steel work is protected throughout with Dixon's Silica-Graphite paint.

It is only through the use of established types of protective paints that county and city officials can insure long life to steel structures.

Hydraulic Rams for Municipal Water-Supplies

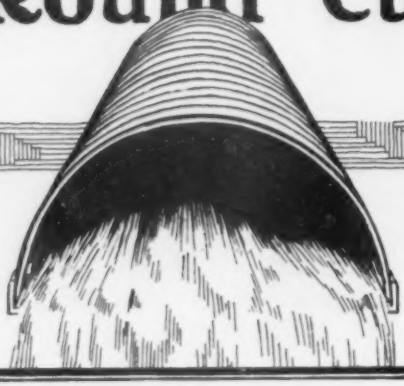
Cities, suburban districts and small towns located where there is an abundance of water with considerable natural fall, can well make use of the hydraulic ram for pumping water by water-power. Wherever a water-supply is available and arrangements can be made to get a fall or drop in this water for power, a hydraulic ram can be used. The water must be piped to the ram, which, in turn, must be kept 5 feet or more lower than the surface level of the water over the intake end of the supply pipe. The drop or difference of elevation is called the "power head." The height above the ram to which the water is to be pumped is called the "delivery head."

Hill hydraulic rams, made by the Seattle Machine Works, Seattle, Wash., are made to operate under a wide range of power and delivery heads and with any ratio of these heads from as low as 1 to 2½ up to as high as 1 to 30. Generally speaking, and within the limits of good operation, increasing the power head automatically increases the capacity of the ram.

Where the water-supply is obtained from a creek or stream, it is usually necessary to carry

BRIDGE OVER LAKE SUMMIT, N. C.

Half Round Culverts



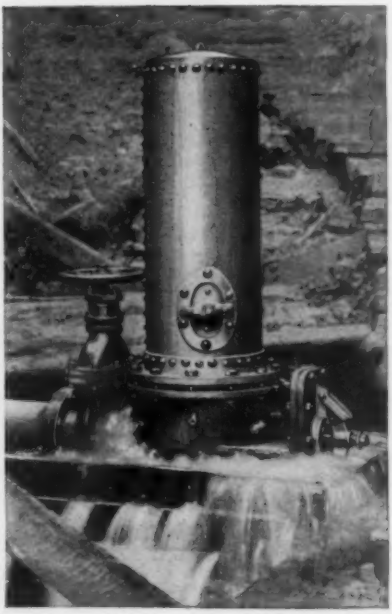
If you want to be more than 99 per cent sure that the culverts you have installed under your city streets or county highways will last indefinitely, install a NEWPORT CULVERT, made of "GENUINE OPEN HEARTH IRON", guaranteed to be 99.875 per cent pure iron-copper alloy.

NEWPORT CULVERTS are made in both round and half-round types of construction. The half-round type is particularly adapted to city and small town use, while the circular culvert is universally used for county highway work. The advantage of using the half-round culvert lies in its being particularly well adapted where the head room is not sufficient to install the full circle type of pipe, and in the further advantage of being able to clean it readily at any point in the event some obstruction causes the stoppage of same, which is frequently the case in city or small town use.

Send for booklets giving complete data on NEWPORT CULVERTS of "GENUINE OPEN HEARTH IRON"

NEWPORT CULVERT Co

542 WEST 10TH STREET NEWPORT, KENTUCKY



A 6-INCH HYDRAULIC RAM INSTALLED TO PUMP 120,000 GALLONS OF WATER DAILY AT WOODWAY PARK, KING COUNTY, WASH.

it some distance down the stream to get a good operating head. This can be done by diverting the water and carrying it the required distance in a flume, a ditch or a pipe, which should, if possible, discharge into a tank or a small reservoir, from which the drive pipe of the proper length can be laid to the ram. If a pipe line should be too long to use as the regular drive pipe to the ram, it can, if desired, be arranged so that, in place of emptying into the supply tank, the stand-pipe can be put in the line and from this stand-pipe the drive line proper can be laid to the ram.

Birmingham Office for Central Foundry

The Central Foundry Company, 41 East 42d Street, New York City, has announced the opening of a new branch sales office on the twenty-second floor of the Jefferson County Bank Building, Birmingham, Ala. T. C. Hyde is the manager of the new office, under the direction of J. L. Brierton, Vice-President and General Manager of the Central Iron & Coal Company. Mr. Hyde will continue the sale of Universal pipe in the Southern territory which he handled from the Central Foundry Company's Atlanta office, now discontinued.

Mound Traffic Markers

The increasing need of traffic markers to keep automobiles and trucks out of safety zones and to direct traffic, has led the Mound Traffic Equipment Company, 184 West Spring Street, Columbus, Ohio, to place on the market the new Mound traffic marker for street intersections, safety zones and for the night and day regulation of traffic.

The ordinary upright street intersection or safety zone sign is often the cause of serious accidents by collision with the sign itself. This occurs through purposely driving into the sign to avoid hitting another machine or a pedestrian. Vehicles of any kind can drive over the Mound type of marker in emergency without injury to the vehicle or the marker. The marker is of sufficient area and weight to give it a firm hold and is of ample strength to stand the shock of heavy vehicles. With the upright sign, accidents result from the fact that the visible part of the sign itself is frequently above the driver's natural line of vision, and is often not seen by him until too late to avoid striking the sign. When driving, the line of vision is naturally directed to the street surface a few yards ahead of the machine. The Mound type marker has a distinct advantage, as it is placed on the street surface with the lettered directions directly in line with the driver's sight.

This marker has an especially designed depressed letter which catches and reflects light from all sources, making brilliantly illuminated inscriptions both by day and by night, At night the marker catches a maximum of

FIRE ENGINE CROSSING TRAFFIC MARKER SHOWN BEING PAINTED IN "CLOSE-UP" BELOW

General Motors Trucks

GMC

Well digging rig on G M C Chassis used by W. F. Kernin at Sutherlin, Ore.

GMC Carries Well Digger Used in Getting Water for Oregon City

Firms who specialize in municipal work of various kinds have taken the experience of municipalities as a guide and have adopted G M C trucks for their hauling equipment.

Among these is W. F. Kernin, an Oregon well driller who has a splendid story to tell of his experience with a 2-ton G M C truck. Mr. Kernin specializes in drilling water wells for Oregon municipalities and he has mounted a rig on his G M C.

"We drilled 44 wells in 1921, writes Mr. Kernin, "and covered a 30 mile radius with the truck, which carries the rig easily. We can move 30 miles, set up the rig and get a good chunk drilled in one day. Power — the truck has worlds of it and can move the rig for $2.00 where it used to cost $100 with horses."

The operation illustrated was at Sutherlin, Ore., where six wells were drilled for the city, supplying 250,000 gallons a day.

Road contractors, pavers, garbage contractors and others also have adopted G M C as a standard. This is because G M C trucks give more continuous operation at a lower cost and for a longer period than has heretofore been averaged by motor trucks.

G M C trucks list at the factory as follows: One Ton, $1295; Two Ton, $2375; Three and One-Half Ton, $3600; Five Ton, $3950; Tax to be added.

GENERAL MOTORS TRUCK COMPANY

Division of General Motors Corporation

Pontiac, Michigan

DEALERS AND SERVICE IN MOST COMMUNITIES

When writing to Advertisers please mention THE AMERICAN CITY.

the light from the street illumination, as well as from automobiles, and may be greatly intensified by the use of an overhead spotlight at street intersections. It may be repainted at small cost by an inexperienced workman. The cast-in letters cannot become effaced and do not need to be again outlined. They are refinished by a simple mechanical process.

Slow-Speed Trailers in Levee Work

The Mississippi River Levee Commission, operating heavy construction work at Whitehall Landing, Ark., is using 27 5-ton Holt Caterpillar tractors and 3 10-ton Caterpillar tractors in connection with a number of Miami reversible all-steel trailers made by the Miami Trailer Company, Troy, Ohio. The average haul is 500 feet, and the height of the level is from 35 to 45 feet. The 5-ton tractors each haul one Miami trailer carrying 4 cubic yards of material, and average 10 to 14 round trips per hour. On the same class of work 4 good mules are required to handle 1 cubic yard of material. Accordingly, 1 5-ton tractor and 1 trailer displace 20 mules and 4 drivers each trip, and are able to make easily 3 round trips to 2 round trips for the mule outfit.

It is estimated that the actual cost of handling work of this character, not including interest and depreciation, with 10-ton tractors hauling and 5-ton tractors hauling material away with the slow-speed trailers, does not exceed 10 cents per cubic yard. The trailers used have a track of 5 feet 9 inches, measured from center to center of tires, and a wheelbase of 7 feet 5 inches. The body is built entirely of steel with 3/16-inch plates reinforced with angle-iron at the extreme top and bottom and further reinforced by angle-posts following the body line from top to bottom, all connections being riveted. The doors are made of No. 10 gage steel, reinforced with hot riveted angle-steel, giving a bottom opening 38 x 73 inches. Each trailer has a level capacity of 3 cubic yards, or 3½ to 4 cubic yards when slightly rounded.

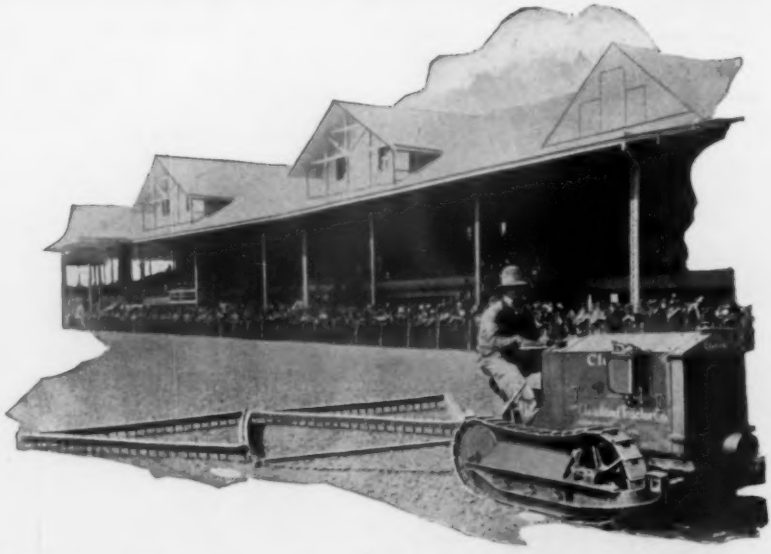
Specialist in Electrolysis

E. R. Shepard, who has been associated with the Bureau of Standards for more than seven years in connection with electrolysis research and field surveys, has resigned and will devote his time hereafter to consulting work of a similar character. Mr. Shepard is well known through his publication on rail bonds and joints and track insulation and through his activities in connection with the publication of research work on the American Committee on Electrolysis. His address in the future will be 4111 Fessenden Street, Washington, D. C.

A HEAVY-DUTY, HIGH-SPEED 6-TON TRAILER FOR GRADING

New District Engineer

The Portland Cement Association, 111 West Washington Street, Chicago, Ill., has announced the appointment of F. S. Altman as District Engineer in charge of the Minneapolis office of the Association, to succeed W. E. Hart, who has been transferred to the general office as manager of the Structural Bureau. The Minneapolis office, located in the Metropolitan Bank Building, has charge of the Association's work in Minnesota and North and South Dakota.



The Town's Money Saver

IN every community where Cletrac has become a part of the municipal machinery, it has won the endorsement of the town. Cletrac is a money saver!

The same people in the above illustration who are watching Cletrac put the finishing touch to the race track know that its ability to do an equally good and an equally economical job applies also to work in parks, grading roads, sprinkling streets, pushing snow plows, performing heavy hauling duties—in fact, doing almost any job around the town.

One municipal engineer writes—"I have no hesitation in voting Cletrac a great machine for municipal work, and hope to be able to induce my Council to see the economy in purchasing another."

Cletrac's low operating cost combined with its great work capacity saves money for the taxpayers in any community. We shall be glad to send you facts and figures on the work Cletrac is doing today for cities or towns like your own.

HARD THIS WAY. BUT—

EASY ON A TRACK THE CLETRAC WAY

THE CLEVELAND TRACTOR COMPANY

Largest Producers of Crawler Tractors in the World

Cletrac

19205 EUCLID AVE.
CLEVELAND,
OHIO

When writing to Advertisers please mention THE AMERICAN CITY.

Gas Street Lighting

We are advised that the cities of Cambridge, Mass., Wilmington, Del., Wenonah, N. J., and Lowell, Mass., have recently renewed their gas street lighting contracts. The following municipalities have recently installed additional Welsbach gas street lamps: Kenmore, N. Y., Essex County Park Commission (Newark, N. J.), East Orange, N. J., Carrick, Pa., San Francisco, Calif., Revere Beach Reservation, Mass., St. Louis, Mo., Mount Vernon, N. Y., Rye Park, N. Y., Woodhaven, Conn., Woodmont, Conn., Camden, N. J., and Baltimore, Md.

GAS STREET LIGHT IN WASHINGTON, D. C.

An Emergency Truck for Shutting Off Water-Works Valves

An emergency shut-off truck for handling quick closure of large water-works valves has recently been developed by Payne Dean, Ltd., 103 Park Avenue, New York City. This emergency shut-off truck consists of a 1922 model Reo speed-wagon chassis fitted with a Payne Dean valve-operating take-off. The valve-operating mechanism is a special transmission permanently attached to the chassis and arranged to carry square valve operating keys of different lengths. All three forward and reverse speeds of the truck are available for operating the valve-closing mechanism.

On each valve in the zone of operation is attached a Dean position indicator which shows the exact number of turns the valve is open. This indicator is applied to the valve without any alterations whatever and takes the place of the valve nut. The operating end has a standard 2-inch nut to suit both truck and hand wrenches. On the dashboard in front of the driver is the automatic cut-off indicator having an illuminated dial and adjustable numbers. The numbers on this dial are set to correspond with the numbers on the dial of the valve-position indicator, after which the clutch is let in through, perhaps, the second speed of the car. The valve completely closes and the engine automatically stops. It is impossible to jam the valve, and for further protection the cut-off may be set to stop a few turns from full closed position.

The automatic cut-off operates also when opening the valve. By aid of special universal joints, the vertical key shaft may be as much as 10 inches off center. An adjustable shear coupling in an accessible position is provided for protecting the valve stem. A special low-head centrifugal pump is provided under the rear end of the body, driven by the transmission and provided with a clutching and de-clutching device.

Among the city water departments using this truck shut-off are: Department of Water Supply, New York City; Bureau of Water, New Bedford, Mass; Bureau of Water, Boston, Mass.; Metropolitan District, Boston, Mass.; Bureau of Water, Philadelphia, Pa.

The Hiram Phillips Engineering Company

The Hiram Phillips Engineering Company, Fullerton Building, St. Louis, and Bertig Building, Paragould, Ark., has been organized as successor to W. R. Heagler & Sons, of Paragould, Ark., and Hiram Phillips and Paul P. Phillips, of St. Louis. Mr. Heagler will have charge of the Paragould office, and Paul P. Phillips will look after the St. Louis office. The organizations which make up this new engineering company have handled considerable municipal water-supply work, drainage, levee and irrigation work, sanitary and storm sewers, paving, steam and electric railroad work and highway construction jobs in the last few years, particularly in Missouri, Arkansas, Colorado and Illinois.

Write for full data, prices and the names of our nearest dealers. Let us give you the details of how economically Best Tractors build and maintain streets and roads.

DEPT. OF HIGHWAYS
OKLAHOMA COUNTY.
OKLA.

COURT HOUSE
OKLA. CITY

PHONE
MAPLE 1430

March 29, 1922.

The attached is a photograph of the BEST "60" Tractor, No. 592-A, purchased from the Cardwell-Lyman Sales Company of Oklahoma City, by Oklahoma County, on February 2, 1921.

Our records show that this tractor has been run approximately 2700 miles. It has graded 30 miles of road that had never been graded before, and 194 miles of road that had been graded; total 226 miles of road graded.

Also it has pulled stumps, dragged roads with planer, and moved approximately 5,000 cu. yds. of dirt an average distance of 300 feet.

The tractor is in perfect condition and shows very little wear.

Total repairs used on tractor to date	$ 88.25
Total gasolene and oil (including gas for operator's car)	1478.68
Salaries for tractor and grader operators	3318.00
TOTAL	$4884.93
Total number of days worked---------208	
Total expense per day----------$15.86	
Total days grading, 282 @ $15.86	$4472.52
226 miles road graded in 282 days, total cost per mile,----------$19.79	

This tractor has been down for repairs approximately ten hours in the total fourteen months.

Matt Peters
Tractor Operator
J. W. A. Potter
Grader Operator
Geo. A. Gaskins
Auditor Assessor's Office
Ralph S. Jones
County Engineer.

SUBSCRIBED AND SWORN TO Before me, a Notary Public in and for Oklahoma County, this 29 day of March, 1922.

Gertrude E. Miller

Comm expires 6/2/23

C. L. BEST TRACTOR CO.

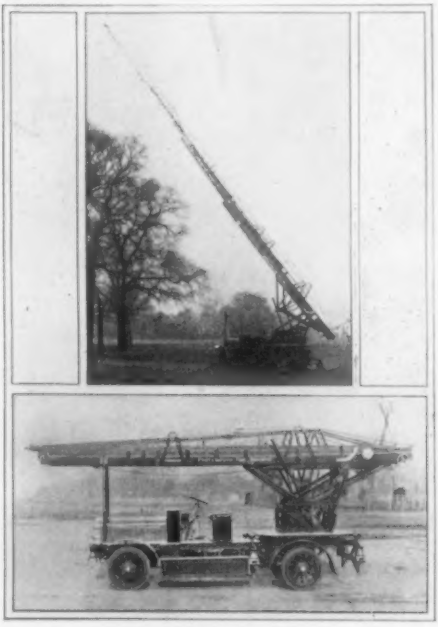
Factory and General Office
SAN LEANDRO, CALIFORNIA

Distributing Warehouses
SPOKANE, WASH., ST. LOUIS, MO.

BEST TRACTORS

Wasser Becomes President of A. R. B. A.

Thomas J. Wasser, State Highway Engineer of New Jersey, was elected President of the American Road Builders' Association at the adjourned meeting on June 15, 1922.



AN EXTENSION LADDER WITH SHORT WHEEL-BASE

An English Motor Turntable Fire Ladder

An extension ladder with a short wheel-base somewhat different from the long wheel-base type used in the United States, is manufactured by Merryweather & Sons, Greenwich Road, F. E. 10, London, England, and is in quite general use in that country. The mechanism for raising the ladders to an upright position and extending them telescopically is operated by the same motor which drives the machine itself. After the ladder-operating mechanism is put into gear, one man, by the manipulation of a pair of levers, has complete control of the raising and extension of the ladders, both of which operations can be carried on simultaneously. The chassis of the turntable ladder is propelled by a 4-cylinder motor, producing 65 brake horse-power.

On the upper side of the chassis framing directly over the rear axle is fixed a steel forged ring upon which revolves an angle steel ring, carrying the whole of the ladder unit. On the upper ring is constructed a section steel framework carrying the fulcrum upon which the ladders are swung and the whole of the details of the operating mechanism for working the ladders. The ladder-operating mechanism consists of a vertical spindle in the center of the turntable rings, driven direct from the crank-shaft of the motor through the changed speed gearbox and by a bevel-toothed gearing mounted on the base of the turntable. This mechanism is thrown in and out of action with the transmission gear of the motor by a hand lever operated from the driver's seat.

The gear for raising the ladders consists of a pair of screwed shafts driven through bevel wheels by one of the horizontal shafts. The gear for extending the ladders consists of a revolving drum, driven by a toothed wheel speed reduction gearing from one of the horizontal shafts, on which drum is wound a flexible steel rope running over a pulley on the fulcrum spindle, and attached to the foot of the first sliding ladder. An automatic ratchet and pawl gear is provided. The ladders are revolved around the turntable by a worm-and-wheel gearing operating through a vertical spindle, a toothed pinion engaging with a toothed ring fixed to the lower turntable ring. The ladders can be slewed around on the turntable in a complete circle.

Indicator plates showing the extension of the ladders and the safe angle at which they can be worked are placed in full view of the man operating the levers, and safety devices are provided to prevent any over-extension. The ladders are constructed in four sections, the lowest section being pivoted on the frame and adjusted laterally to it by a screw gearing for keeping the ladders always plumb sideways if the motor chassis is standing on uneven ground. The sliding ladders are raised simultaneously by the wire rope, and each ladder is fitted with an automatic safety clutch which would come into action should a rope break. The ladder sides are made of selected Oregon pine with oak rungs dovetailed into metal sockets recessed into the ladder sides, each rung forming a stretcher without any holes being made through the sides of the ladders. The ladders are constructed to reach from 60 to 90 feet if necessary.

TOWNSHIP TO LIGHT ALL ITS HIGHWAYS

The township of Amherst, N. Y., which lies adjacent to Buffalo, has decided to illuminate the highways within its borders, this being the first instance, so far as is known, in which a township has decided to light all its roads. The work of lighting the one hundred miles of roads will be spread through a period of three years, and the complete installation will consist of between 1,000 and 1,500 units, including those to be placed along the portion of the Buffalo-Niagara Falls Boulevard.

Packard - Northern Passes Twelve Hour Underwriters Pumping Test --- 750 Gallons

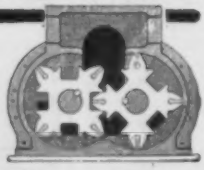
100%

May 23rd, a Standard Packard Twin Six chassis equipped with Northern Rotary Pump passed the 750 gallon standard Underwriters Pumping test with a perfect score. Test was conducted by Engineer Woodcock of Chicago office of National Board of Fire Underwriters. This test was the equivalent of running this car 65 miles per hour continuously for over 14 hours. (Pumper was on the job at 6:00—Mr. Woodcock arrived from Chicago and took his first reading at 8:39.)

It's Another Victory for

The Northern Rotary Pump

NORTHERN ROTARY PUMPS



"MORE GALLONS PER HORSE POWER"

Send for literature.

These cities are using Twin Six Packard Pumpers—
Madera, Pennsylvania.
Corsicana, Texas.
Bridgeport, Connecticut.
South Saint Paul, Minn.

These cities have ordered—
Hershey, Pennsylvania.
Reierstown, Maryland.
Wierton, West Virginia.
Wilmington, N. C.
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NORTHERN FIRE APPARATUS CO.
MINNEAPOLIS, MINNESOTA. U.S.A.

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